

HYDROTHERAPY

AT

SARATOGA



IRWIN

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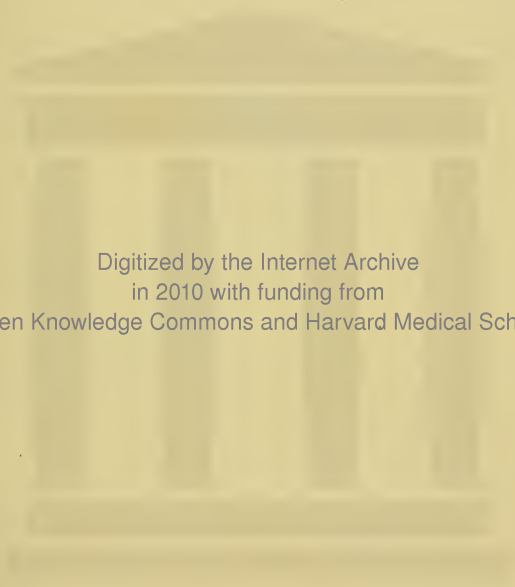




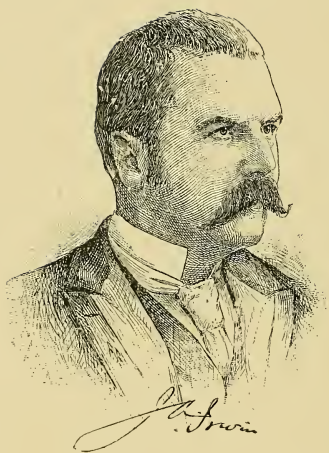
HYDROTHERAPY AT SARATOGA

Sacred Fonts ! flow on forever,
Health on mankind still bestow ;
If a virgin woo thee, give her
Rosy cheeks and beauty's glow ;
If an old man—make him stronger,
Suffering mortals soothe and save,
Happier send them home, and younger,
All who quaff thy fervid wave.

—LOBKOWITZ : trans. JOHNSTON.



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HYDROTHERAPY

AT

SARATOGA

*A TREATISE ON NATURAL MINERAL
WATERS*

BY

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PREFACE.

THE United States, in so many respects exceptionally gifted, possesses already more than 8000 known mineral springs, of which about 800 have been analyzed, and not a few found equal, if not superior, to those of highest repute in the Old World.

Nevertheless, the scientific use of mineral waters is strangely ill-defined, and, since the days of Priessnitz—the father of the so-called hydropaths, who accepted water as the only remedy for all diseases—a certain atmosphere of quackery has permeated the subject, resulting in its neglect by reputable physicians.

Visitors at the watering places are glutted with circulars and pamphlets issued for purposes of advertisement, by persons financially interested, and each putting forward in almost identical clap-trap the same absurdly pretentious claims.

Saratoga is especially so plagued; owing, in a measure, to the large and increasing number of the springs, and the occasionally hostile rivalry of the proprietors. As a consequence, the waters are used without proper guidance or discrimination, and often improperly, with disastrous result; and in the public estimation there remains scarce any middle ground between an unquestioning cure-all faith and an equally unreasonable condemnation.

The purport of this work is to

establish among educated readers a correct and unprejudiced valuation of mineral waters generally, and those of Saratoga in particular.

Mineral springs have been known and appreciated from the earliest times, both for drinking and bathing purposes. They have been written upon by Hippocrates himself, and since the days of Herodotus and Pliny. It is easily conceded, then, that a treatise upon this subject can in few respects lay claim to originality ; and, as will be noticed in the text, the author acknowledges a wide obligation to others, and in some instances holds them duly responsible for opinions not coincident with his own, or confirmed by direct experience.

It has, at least, the merit of being absolutely non-partisan—from the pen

of one who, while highly esteeming mineral hydrotherapy in its by no means unlimited sphere, regards it as nothing more than an important, although much neglected branch of general medicine. In teaching its uses it is impossible at times to avoid entering somewhat fully into the clinical aspects of disease, and the associated applicability of other methods of practice. It should not be understood, however, that this work is intended as a guide to self-treatment, even within the confines of hydro-therapeutics; nor can it supersede for sick persons the necessity of professional advice, which must always vary in accordance with the circumstances of each individual case. But, as an intelligent patient, capable of understanding and co-operating with the

aims of his physician, is more likely to derive benefit from treatment, so it is desirable that persons visiting Saratoga, and making use of its waters, should have some general knowledge of their characteristics and mode of action.

It is also hoped that in the following pages the professional reader may find information, not without interest and practical value; and, although some points are left untouched, or still in doubt, which may be more fully discussed in the future, it should be remembered that, as in all other branches of knowledge, "not directly, but by successive approximations do mankind reach correct conclusions."*

*Grand Union Hotel,
Saratoga.*

*No. 14 West 29th St.,
New York.*

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Hydrotherapy at Saratoga

CHAPTER I.

SARATOGA.

A FEW weeks' sojourn at the seaside, or some inland health resort, has become to Americans a national necessity. The average city man of to-day can scarcely be considered entirely healthy. If seldom absolutely sick, he is quite often "a little under the weather." He will tell you that nothing ails him; but follow closely his daily life and you will find that he is constantly taking medicines—as his forefathers never did. Now it is a

quinine pill to brace up on, or combat a latent malaria ; now some antipyrine or phrenacetine for a cold or headache ; now some pepsine or a cathartic for his stomach or bowels, and so on.

Why is this so ? Because of his own imprudences : his hurrying, restless, nerve-straining life, constant high pressure, too many bracers, irregular meals, eating too much and chewing too little ; but always ready to sacrifice the requirements of nature on the insatiable altars of business or pleasure. Such a one walks upon the edge of a precipice from which he cannot be induced to tear himself away ; but he is often willing to postpone the inevitable crash, which, even he knows, is bound to come sooner or later, in the form of cirrhosis, Bright's disease, or

some miserable neurosis, by giving his system a complete renovation at least once a year.

For this purpose a visit to some bright summer resort is just what he needs; and none on this hemisphere offers as wide advantages as Saratoga. Not only are the waters pleasant to drink, and available in some form to the majority of visitors—the pleasure seeker following in the route of fashion, as well as the invalid, the exhausted brain-worker, and the fagged-out beauty striving to regain her lost complexion—but all the attendant circumstances are usually conducive to the restoration of perfect health. The rapid succession of new events enlivens the mind and leads away from worryment. The pure country air, the mod-

erate altitude, the usually pleasant temperature and cool nights, the altered diet, the increased bodily exercise, the easy relinquishment of injurious habits, the facilities for active recreation of all kinds and luxurious bathing, combined with a delicious rest, which is not idleness but merely change of thought—each plays its part in accomplishing a physical and psychical recuperation.

To one who, during ten months out of the twelve, is obliged to live in, and breathe, the dirt-carrying, moisture-laden atmosphere of the sea-board cities, the air itself has a conspicuous cleanliness brimming with health. He notices that stray articles he happens to touch no longer soil his hands, even that his linen takes many hours longer

to show the accustomed evidence of wear.

In fact, Saratoga offers all that the country can give, without the intolerable dullness, which at some health resorts renders life a perfect blank.

A good general description of Saratoga—its pleasant location, delightfully shaded streets, natural beauties, and interesting history; its parks, lakes, magnificent hotels, and never-ending attractions—is to be found in the guide books, and needs but the briefest outline here. The village is situated toward the eastern border of the State of New York, at the termination of the Adirondack range, and about the center of the valley extending from Balston to Quaker Springs. It is distant from New York City 183 miles,

from Philadelphia 274 miles, from Boston 205 miles, from Washington 412 miles, and from Chicago 841 miles, and is readily accessible from all these places. The altitude is about 300 feet. The population varies from about 11,000 in the winter to 35,000 during the season, which lasts from the middle of June to the middle of September. The accommodation for visitors of all classes is ample and excellent, and the general sanitary arrangements are good. The name, like most others in this vicinity, is derived from the Iroquois Indian.

The discovery of the springs is relatively modern, with the exception of the High Rock, which, according to tradition, not long since* confirmed

*1865—Walton.

by interesting remains found at the base of the rock, was known to, and utilized by, the Indians back in the fourteenth century. The earliest knowledge by white men of the valuable qualities of the waters seems to date from the advent of Sir William Johnson in 1767. That illustrious Scotch-Irishman, who in colonial days served this country scarce less than did subsequently George Washington, is mainly known to the popular history of to-day by the incident that, when he ailed unto death, the Indians, whom he had befriended and controlled by kindness and integrity, carried him for relief to the "Medicine spring of the Great Spirit," at Saratoga. The first white man's habitation was erected in 1773.

During the subsequent thirty years various sturdy pioneers kept simple taverns for the entertainment of such visitors as were, even then, attracted by the growing reputation of the springs; but the starting point of the Saratoga of to-day may be reckoned from the building, by Gideon Putnam, in 1802, of Union Hall; upon the site of which now stands the magnificent Grand Union Hotel.

Since then over forty new springs have been discovered, any one of which might make the reputation of a health resort; superb hotels have been erected on all sides; and America has become possessed of a Spa which, in every respect, rivals the oldest and most esteemed in Europe.

CHAPTER II.

THE ORIGIN OF MINERAL WATERS.

MUCH interest still attaches to the origin of mineral springs, but belongs rather to the fascinating science of geology than to the mainly therapeutic scope of this treatise.

From remote antiquity, through the superstitious ages, when good spirits were believed to guard medicinal springs, all manner of fantastic theories have had ardent advocates ; and the subject has been abundantly discussed by wise men and by fools.

The rational points of inquiry are :
(1) Whence comes the endless supply of water ? (2) How does it obtain its

mineralization and gaseous saturation?

(3) What local peculiarities determine its emergence?

The answers are fairly within our knowledge: (1) The water itself is neither newly created beneath the earth, nor is it the out-pouring of a subterranean sea, but is merely a part of the great aqueous circulation of nature; and hence does not end. If we trace this circulation through its course, taking rain as a starting point, we find that as water descends from the clouds a portion goes directly into the lakes and rivers, or to renew the great salty reservoirs; while the remainder, falling upon the land, is collected on the surface to form mighty rivers, or else sinks deep into the ground; but not to remain there permanently. It

finds its way through soil and rock, through fissures and joints, until finally, by continuous descent, it reaches an outlet at some lower level ; or else by hydrostatic pressure is forced back to the surface in the form of springs. Then, having fulfilled its assigned purpose, whatever that may have been on earth, all which came from the skies passes away again by evaporation, to be recondensed in the atmosphere above, and fall once more as rain.

Thus is completed a single round of one of the stupendous revolutionary systems which govern the entire course of nature, and know no pause or stay. How long this circuit may occupy for any particular water, such as that which issues from the springs, it would be idle to speculate ; but ultimately, “that

which the fountain sends forth returns again to the fountain." It has been proven by experiment* that the quantity of celestial water which falls as rain, snow, and dew is more than sufficient to supply that which flows from the rivers and springs all over the world.

(2) Now as to its mineralization and acquisition of gases: Water is unequalled as a solvent. No known substance can entirely resist solution by water ; † and as a consequence absolutely pure water scarcely exists in nature. As the rain descends from the skies, even before it reaches the earth's surface, it has already absorbed impurities from the atmosphere ; and from then

* Mariotte and Halley.—*Walton*.

† A. Geikie, "Text Book of Geology."

until it again passes off by evaporation, when—like man at his exit—it must leave all behind, it is—like man during his stay—constantly picking up something from each media with which it comes in contact.

Already armed with minute quantities of carbonic acid and other ingredients from the air, it proceeds to take up the organic acids which are plentiful in the surface soil, and, thus early equipped with considerable chemical activity, sets out upon its geological career. It permeates, to unknown depths, the rocks and minerals which form the crust of the earth, and all of which are more or less porous to water, and, as it percolates through them, dissolves and carries with it certain of their constituents. These meeting

others of possibly chemical antithesis, countless compounds are formed ; new gases are generated, which are also absorbed by the water, and utilized to augment its further solvency, until ultimately, after an eventful history, there is forced to the surface the extraordinary, indefinitely varied compound known as *mineral water*.

This the analysts handle with skill. They separate and weigh accurately, up to a five-thousandth part of a grain,* the *basic ingredients*, which are found, in almost every instance, to correspond with the composition of the rocks from whence they came ; but the science of man has not yet ascertained the exact character of the chemical *compounds* resulting from this intricate tour of

* Breneman, *Nat. Bot. Gaz.*

Nature's laboratory ; any more than it can invariably explain the physiological chemistry following their ingestion.

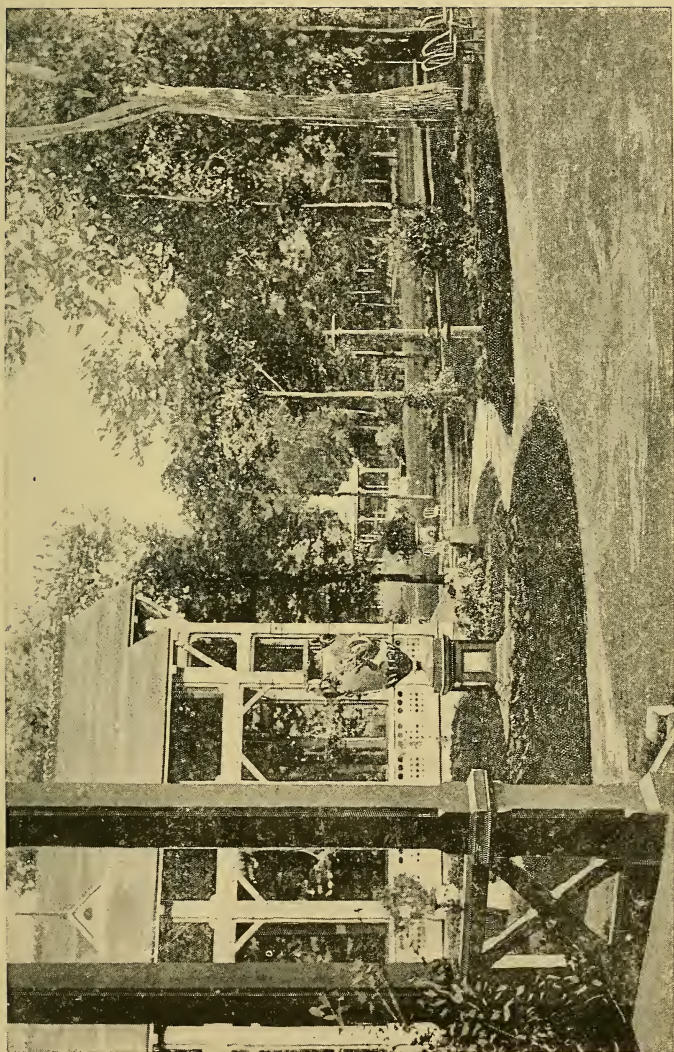
(3) The emergence of mineral springs at certain localities is dependent upon the nature and integrity of the geological strata beneath.

However may be solved the great cosmical problem of the manner in which the earth, from being a semi-liquid, nebulous mass, whirling through space, became the beautiful world we now inhabit, it is certain that the formation of its crust, whether by the hardening of fluid, or the deposit of sedimentary substances, took place at different periods, and in layers of various thickness and composition, superimposed one upon another. It is also certain that, while this heterogeneous

crust was in course of formation and still malleable to internal force, seismic disturbances shaped hills and valleys; but long afterwards—perhaps many centuries—when the surface crust had become too hard to bend, similar volcanic outbursts resulted in huge cracks or fissures, penetrating to the very bowels of the earth, and often attended by dislocations of strata, which deranged the original levels, so that when the broken surfaces came together again, rocks of different quality were in apposition to each other.

In some instances, however, the partings thus made were permanent; and when fierce earthquakes had quelled, mighty chasms, even miles in width, remained forever.

As ages rolled on, the relatively



CONGRESS PARK.

smaller interspaces became filled with deposits of various character, usually more permeable than the original rocks, while many of the larger breaks still endure, and may be seen interspersed among the loveliest scenery of the world—as straits, like that of Magellan, or Smythe's Sound, or as narrow valleys and mountain gorges, bounded in between corresponding surfaces of perpendicular cliff.

In comparison with these stupendous natural convulsions of the past, how small appear the volcanic activities of to-day : the phenomena of our Yellow Stone Park ; or even the wonders of Ojigoku, the Great Hell of Japan, where one day the ground is solid and the next a bubbling, boiling spring.

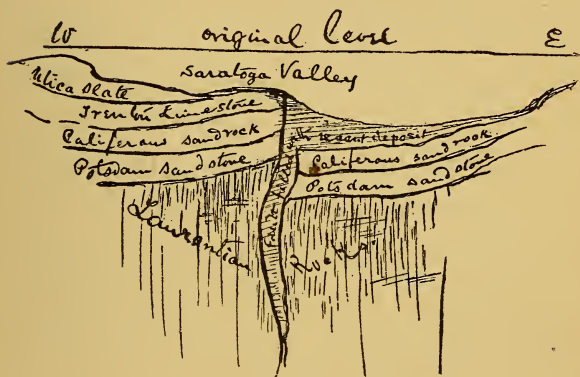
CHAPTER III.

GEOLOGICAL CONDITIONS AT SARATOGA.

CRACKS and disturbance of strata are termed by geologists "faults." They vary from immense rents and spacious caverns to tiny crevices, running in all directions through colossal layers of rock. It is easily understood how water imprisoned—often under high pressure, between the less pervious strata—should find at these points a means of escape, and thus make its way upward. As a matter of fact it is the presence of geological faults of some degree which determine, in most parts of the world, the emergence of mineral springs.

At Saratoga there is a geological "fault" of extensive proportions—the result of some terrific upheaval long ago. Originally a huge irregular fissure of incalculable depth, and extending through the valley many miles to the northeast and southwest of where the village of Saratoga now stands, it is probable that both sides of the chasm were depressed many thousand feet below their pristine horizontal; but the eastern edge sunk considerably lower than the western, so that when, during subsequent centuries, the interspace became filled with calcareous deposits, the long-parted strata no longer occupied corresponding levels; but those to the eastward lay not less than fifty feet below their counterparts upon the other side.

The accompanying cut, modified from one by Professor Chandler, fairly illustrates the situation.



Captain Butler, in his essay on this subject,* notes two particularly interesting local circumstances : (1) That all the springs which have appeared or been discovered, at or near Saratoga, are to the *eastward* of the fault ; while

* Saratoga, 1888.

upon the western side, although every effort has been made and the drill sunk through the rock at various points to a depth of one thousand feet, no mineral water has been found. (2) Also, that although the same water may frequently be reached, but at a depth increasing proportionally to the distance, by boring in a direct line *to the eastward*; if the opening be made to the north or south of this line, a spring may be reached, but it will usually be of different character, and unconnected with the first.

According to the same authority, the drill, in passing downward through five or six hundred feet of rock, is liable to tap, at different depths, several independent streams of mineral water of diverse quality, of which the owner may select and utilize that which he pre-

fers. This occurred in the boring of the Royal Spring in 1887.

From these data, supported by the ascertained dip of geological strata *toward the fault*, he deduces the theory that the watershed which feeds the Saratoga springs extends from the mountain ranges thirty odd miles to the eastward; from whence the water percolates downward toward the west, dividing itself, by the way, into distinct streams at various depths, until ultimately—unless tapped by artificial boring—it reaches the almost perpendicular wall of later deposit, which fills the fault, and there finds more pervious material, or else convenient crevices, favoring its ascent toward the surface. As, however, there are also mountains upon the western side, and as the strata,

on that side also, incline toward the fault, and slightly toward the south, and there is no positive proof of the non-existence of mineral water, while ordinary water has been reached at considerable depth, it seems probable that the western rainfall may also contribute to supply the springs.

There is no subterranean connection between the Saratoga springs and the ocean ; nor, as a rule, is there evidence of inter-communication between neighboring springs ; which, although sometimes rising but a few feet apart, maintain their special characteristics. Unquestionably, however, some collateral intercourse through the ramifying crevices in the rocks is possible between the Congress, Hathorn, Favorite, Patterson, Putnam, and Imperial Springs ; for although, in their normal condition,

each has very distinct individuality, on each occasion when one has been depressed, by excavation or pumping, it has unfavorably influenced, some or all, of the others.*

The flow from the springs is constant from year to year, and at all seasons, and seems scarcely to suffer by the repeated borings in search of new water, which here, unfortunately, there is no law to control.

Intermission or spouting occurs in fountains such as the Champion and Geyser, obtained by deep artesian boring ; and is explained on the supposition that the drill opens the water cavity at a point below its highest part ; thus leaving a kind of pocket above the level of the aperture, in

* A similar circumstance has been observed at Aix-la-Chapelle, and other foreign Spas.

which free gas collects; until at intervals the tension becomes so great that forcible expansion takes place: the accumulated gas, so to speak, blows



itself off, resulting in periodically increased upward pressure in the tube.

At the Champion the column of water is said to have been driven at

times upward of ninety feet into the air.* Similar, although milder phenomena, observed at other places,† where the paucity of gas would preclude this theory, are attributed to syphon action emptying a natural cistern, and temporarily ceasing during the intervals while it refills (?).

Professor Tyndall has demonstrated that the magnificent spouting Geysers of Iceland owe their recurrent accelerations to periodic explosions of condensed steam, generated at a higher temperature—relatively equal, owing to increased pressure—deep in the earth's bosom.

There are already more than forty

* Butler.

† Such as Colmars ; or Pliniana on the shores of Como, described by Pliny.—*Walton*.

mineral springs in the village and immediate vicinity of Saratoga ; and without doubt others may be discovered whenever sought for. As far as can be ascertained, twenty-eight have been analyzed at various periods ; and all are so abundantly mineralized that there can be no question as to the propriety of styling them “mineral waters” ; although the term, as generally applied, is ambiguous, and not a few springs in other localities, which have acquired reputation for medical properties, are found on analysis to differ little from some ordinary potable waters. Any one of Saratoga’s waters possesses more chemical quality and therapeutic merit than many European Spas, which have earned world-wide celebrity.

CHAPTER IV.

CLASSIFICATION AND ANALYSES.

FOR a clear understanding of the general subject, and for comparison of our own with foreign waters, a scientific classification of *all* mineral springs would be desirable; and has been attempted at various times with, unfortunately, but indifferent success.

There is a French, a German, and an American classification. Waters have been classified according to their chemical characteristics as *alkaline*, *saline*, *chalybeated*, *sulphated*, *magnesian*, *lithic*, *calcic*, *salicious*, *iodized*, *arsenical*, and *acidulous*; according to their gaseous qualities, as *carbonated*,

sulphuretted, carburetted, and nitrogenized or azotized; according to their temperature, as *cold, warm and hot, or thermal and non-thermal*; and finally, according to their therapeutic effects, as *laxative, aperient, cathartic, diuretic, alterative, anti-lithic, tonic, and strengthening*. But all of these divisions are unsatisfactory, and in practice misleading.

In chemical enumeration it is only possible to indicate the more prominent constituents, ignoring minor ones, which not infrequently are important factors in determining the special characteristic and remedial potency of the water; and further, most well-known springs — notably those under consideration—contain not one, but many distinct and important

mineral ingredients; and might therefore claim recognition under almost any of these headings. Dr. A. C. Peale, in his recent valuable reports to the United States Geological Survey* describes the Saratoga waters as *carbonated, sodic-muriated, alkaline, saline*; to which he might have truthfully subjoined the additional qualities of *chalybeated* and *calcic*.

From the therapeutical standpoint a classification is quite as hopeless. It may be frankly admitted that we have not as yet a sufficiently accurate clinical knowledge of the effects of mineral water drinking, *alone*, and unaided by auxiliary circumstances, in scientifically diagnosed disease, to form a reliable estimate of the relative value of

* Bulletin, 32.

springs of various quality ; or the exact place to which mineral hydrotherapy generally is entitled among other measures of sound practice. Moreover in attempting to classify a water by its effects, it should be remembered that these are largely governed by the method of imbibition : the hour of the day, the quantity taken, and the physical condition of the individual. For example, a given quantity of any of the saline waters, taken fasting in the morning, may act as a brisk aperient—by passing rapidly through the alimentary canal, thus exciting secretion and increased peristaltic action ; whereas, the same quantity of the same water, taken in divided draughts throughout the day, is easily absorbed into the blood, and conse-

quently may produce excellent alterative and diuretic effects, but without perceptible influence upon the bowels.

As already stated, mineral water analysis can only be absolutely reliable in the estimation of basic salts and acids. The combination of these, as supposed to exist in nature, is merely surmise upon the part of the analyst ; although based upon a general knowledge of chemical affinities, and no doubt in most instances approximately correct.

Unfortunately the present study of the Saratoga springs is hampered by yet another, and more serious source of error, which it is hoped may be early eliminated from future investigation. Of the analyses now available, not a few were made many years ago, long

before the use of the spectroscope, and other advances in the science of water analysis, had rendered possible an accurate report. It is therefore eminently desirable, independent of possible changes in the waters themselves, that these springs should be re-examined by some chemist whose name could be accepted as a guarantee.

Owners neglecting this hint will lay themselves open to grave suspicion; more especially, as it has been observed, both here and abroad,* that the effects of mineral waters are not always what might be expected from the analyses; but that certain springs produce more powerful influence, and of a nature fairly attributable to their contents, than do others stated to contain the

* Madden, "Spas of Germany."

same ingredients in very much larger quantities.

Nevertheless, in the absence of trustworthy clinical evidence, a careful scrutiny and comparison of the component parts shown by analysis will always be our best guide in the therapeutic employment of mineral waters.

Analyses, as commonly presented, are startling masses of figures, calculated to puzzle even an expert arithmetician, and conveying little information to the casual investigator. The quantities of quite crude substances are stated in fractions so minute as to be absolutely ridiculous. For instance, of waters such as those under consideration, many of which contain as much as five or six hundred grains of common salt to the gallon, it seems only de-

signed to perplex, that the exact quantity of this useful ingredient should be particularized down to three decimals of a grain per gallon—or about the one two-thousandth part, to a full gallon of water, of what one would ordinarily consume on a boiled egg, without being conscious of any medication whatever !

The following tables are constructed so as to show at a glance the quantities and proportions of all tangible ingredients—a one-hundred part of a grain to the gallon being deemed as amply accurate for even the most scanty and potent constituent with which we have to deal ; and the water being over-credited with any more minute fraction stated in the analysis quoted. “Traces” of commonplace commodities,

such as borax and strontia, supposed to exist in quantities so infinitesimal as cannot be expressed even in thousandth parts of a grain to the gallon, and, which could not be suspected of therapeutic influence by the most ultra-homeopath, are omitted altogether.

The skeleton table is especially designed for an easy comparison of the different springs.

ANALYSIS OF ONE U. S. GALLON, 231 CUBIC INCHES.

NAME OF SPRING.	LAFAY- ETTE.*	CHAM- PION.	CARSL- BAD.*	GEYSER.	CON- GRESS.*	SARATOGA A.	HATHORN	EMPIRE.	PAVILION.	UNION.
Date of Discovery...		1871	1885		1792	1865	1868	1846	1836	1868
Depth in feet.....		300		132	245	65	402	15		
Analyst and date of Analysis..... }		Chandler 1887	Chandler, 1887	Chandler. Chandler.	Mears, 1892	Pohle	Chandler, 1885	Chandler, 1871	Chandler	Chandler
Sodium Chloride....	782.21	702.24	670.56	562.09	530.86	565.30	478.73	506.64	459.91	453.30
Potassium Chloride..	35.84	40.45	45.16	24.64	26.14	.36	32.86	4.30	7.67	8.73
Total Chlorides.....	818.05	742.69	715.72	586.73	577.00	565.67	511.59	510.94	467.58	462.03
Sodium Bicarbonate.	15.83	17.63	12.25	71.24	10.06	6.76	17.64	9.03	3.77	17.02
Calcium Bicarbonate	242.03	227.08	218.24	168.40	149.83	56.86	147.63	109.66	120.17	96.70
Magnesium.....	195.06	193.92	154.96	149.35	138.12	20.49	130.56	42.96	76.27	109.69
Lithium.....	8.05	6.25	6.70	9.01	5.33		7.30	2.09	9.49	2.61
Barium.....	2.83	2.09	1.92	2.02	.97		.98	.08	.89	1.70
Total Alkaline Bi- carbonates. . . }	463.80	446.97	400.66c	400.02	305.21	84.11	304.11	163.82	210.59	227.72
Iron.....	.76	.65	.70	.98	.74	1.73	.86	.80	2.58	.27
Sodium Iodide.....	1.72	.24	.03	.25	.25		.12	.01	.08	.04
Sodium Bromide.....	3.75	3.58	1.23	2.22	9.66		3.65	.27	.99	1.40
Potassium Sulphate..	.63	.26	.67		.46	3.41a		2.77	2.04	1.82
Silica.....	.79	.70	2.08	.67	.68	1.46	.70	1.15	3.16	2.66
Alumina.....	.07	.46	.16			.38	.26	.42	.33	.33
Total Solids.....	1290.52	1195.59	1121.50	991.55	893.97	656.92	820.85	680.44	687.28	696.17
Carbonic Acid Gas { in Cubic Inches. }	810.23	465.47	713.44	454.09	536.8	212.	490.14	644.67	332.46	384.97
Temperature, F....	48°	49°		46°	50°		48°	54°	50°	48°

ANALYSIS OF ONE U. S. GALLON, 231 CUBIC INCHES.

NAME OF SPRING.	FAVORITE ROCK.*	EXCEL- SIOR.	HAMIL- TON.	PATTE- SON.*	COLUM- BIAN.	ROYAL.*	PUTNAM.*	PEER- LESS.*	WASHING- TON.
Date of Discovery..	1889	1859	1806	1888	1805	1887	1890	1887	1806
Depth in feet.....	648	56		250		603		150	
Analyst and date {	Mears	Allen	Steele	Chandler	Emmons	Chandler	Perkins	Chandler	Chilton
of Analysis. . . }						1888	1891		
Sodium Chloride....	448.12	370.65	297.30	269.93	267.00	265.54	210.91	191.42	182.74
Potassium Chloride.	6.22	7.00		11.91		8.83	2.30	10.43	
Total Chlorides.....	454.34	377.65	297.30	281.84	267.00	274.37	213.21	201.85	182.74
Sodium Bicarbonate	5.70	15.00	27.04	18.77	15.40	6.62	19.86	25.23	8.49
Calcium Bicarbonate	100.21	77.00	92.40	129.42	68.00	146.24	109.40	130.33	84.10
Magnesium	146.78	32.34	35.20	80.20	46.71	81.87	63.11	55.52	65.98
Lithium	5.32			2.32		2.24	1.97	1.29	
Barium.....							1.13		
Total Alkaline Bi- carbonates.....	258.01	124.34	154.64	233.20	130.11	236.97	196.85	212.37	158.57
Iron.....	.47	3.22	5.39	1.22	5.58	1.23	1.08	1.03	3.81
Sodium Iodide.....		4.24	3.00	.16	2.56	.02	.00	.01	2.25
Sodium Bromide....	4.32	.74		.68		.34	1.28	1.22	
Potassium Sulphate.	1.25			.45		3.14	.75	1.25	.50
Silica.....	.93	4.00		1.03	2.05	.83	2.33	1.00	
Alumina.....		1.23		.05		.06	.11	.15	
Total Solids....	719.28	514.75	460.33	518.19	408.30	518.27	416.75	419.63	350.23
Carbonic Acid Gas { in Cubic Inches }	963.38	250.00	316.00	417.08	272.06	500.86	405.15	502.92	363.78
Temperature, F.....	50°	45°	49°		50°	40°	51°		45°

ANALYSIS OF ONE U. S. GALLON, 231 CUBIC INCHES.

Only the analyses marked * are deemed absolutely reliable at the present time. The Hathorn Spring has a new analysis in course of preparation at time of going to press. <i>c.</i> Contains Ammonia Bicarb., 6.59 grains. <i>a.</i> Includes Sulphates of Soda, Magnesium and Calcium. <i>pp.</i> Contains Nitrates, 1.08 grain, Manganese Bicarb., 1.38 grain. <i>p.</i> Contains Ammonia Bicarb., 2 grains, and Manganese, 0.49 grain. <i>r.</i> Given as Oxide of Iron. † Contains Chloride of Ammonia, .80 grain. ‡ Contains Chloride of Magnesia, 10.83 grains.									
NAME OF SPRING.	EUREKA.	KISSENGEN.*	UNITED STATES.	STAR.*	VICHY.*	SELTZER.	IMPERIAL.	RED SPRING.	MAGNETIC.
Date of Discovery..	1866	1872	1839	1835	1872	1865	1884	1770	1873
Depth in feet.....		192		40	180		40		50
Analyst and date of Analysis.....	Allen.	Nichols.	Chandler.	Chandler, 1885	Chandler.	Chandler	Chandler	Appleton	Duffield.
Sodium Chloride....	166.82	135.50	141.88	137.61	128.69	134.30	108.85	83.54	69.03
Potassium Chloride.		16.99	8.63	7.51	14.12	1.34	7.99	6.86	8.04
Total Chlorides. ...	166.82	152.49	150.51	145.91†	142.81	135.64	127.67†	90.40	77.07
Sodium Bicarbonate	8.76	76.62	4.67	18.31	82.88	29.43	9.10	15.33	16.08
Calcium Bicarbonate	41.32	40.27	93.12	118.33	95.53	89.37	98.63	101.26	86.75
Magnesium	29.35	70.47	72.88	47.15	41.51	40.34	29.47	42.41	35.08
Lithium		5.13	4.85	2.04	1.77	.90	3.23	.94	.21
Barium		1.00	.91	.31	.60		.10		
Total Alkaline Bicarbonates.....	79.43	193.49	176.43	186.14	222.29	160.54	140.53	159.94	138.12
Iron	3.00	1.56		2.51	.06	1.71	.10	2.10†	.03
Sodium Iodide.....	4.68	.05	.05			.04	.02		
Sodium Bromide.....		1.81	.84	.37	.10	.04	.33		
Potassium Sulphate.	2.14	1.28		.58		.56	.49		
Silica .....	.54		3.19	.86	.76	2.57	1.35	3.25	.37
Alumina .....	.24		.09	.07	.48	.38	.05		.28
Total Solids.....	258.38	350.59	331.84	337.18	367.32	302.02	270.54	255.68	216.05
Carbonic Acid Gas in Cubic Inches, }	239.00	361.50	245.73	406.93	383.08	324.09	287.51		308.05
Temperature, F ..		40°		50°	50°	50°			

SKELETON ANALYSIS OF ONE U. S. GALLON.

NAME OF SPRING.	TOTAL SOLIDS.	TOTAL CHLORIDE.	TOTAL ALKALINE BICARBONATES.	IRON.	LITHIA.	CARBONIC ACID GAS. <i>Cubic Inches.</i>
Carlsbad.....	1121	715	400	.70	6.70	713
Champion.....	1195	742	446	.65	6.25	465
Columbian.	408	267	130	5.58		272
Congress.	894	577	306	.74	5.33	537
Empire.....	680	510	163	.80	2.09	644
Eureka	258	166	79	3.00		239
Excelsior.....	514	377	124	3.22		250
Favorite.	719	454	258	.47	5.32	963
Geyser.	991	586	400	.98	9.01	454
Hamilton.	460	297	154	5.39		316
Hathorn.....	821	512	305	.86	7.30	491
High Rock.....	628	399	221	1.48		409
Imperial.	270	127	140	.10	3.24	287
Kissengen.	351	152	193	1.56	5.13	361
Lafayette.	1290	818	463	.76	8.05	810
Patterson.	518	281	233	1.22	2.32	417
Pavilion.....	687	467	210	2.58	9.49	332
Peerless.	419	201	212	1.03	1.29	502
Putnam.....	416	213	197	1.08	1.97	405
Red Spring.....	255	90	159	2.10	.94	
Royal.....	518	274	236	1.23	2.24	500
Saratoga A.	657	565	85	1.72		212
Seltzer.	302	135	160	1.71	.90	324
Star.....	337	145	186	2.51	2.04	407
Union.....	696	462	228	.27	2.00	384
United States	331	150	176		4.85	245
Washington	350	182	158	3.81		363
Vichy.....	367	142	222	.06	1.77	383

CHAPTER V.

COMPONENT PARTS OF THE SARATOGA WATERS.

IT will be noticed that identical elements are present in almost all the Saratoga waters; a feature which would still pertain if the analyses of the other famous springs of the world were grouped with these in a single table.

Even when compared with the popular Bohemian group—Carlsbad, Marienbad, and Franzensbad, so much sought after by Americans, and gravely stated to be “quite different from anything in this country”—it will be found that the Saratoga waters,

while superior in many respects, are composed of practically the same chemical ingredients ; with but a single exception, scarcely to be regretted, the lack of sulphate of soda, or glauber salts : a commodity so crude and unimportant, that it is passed over in a recent text-book of *materia medica* * with the single comment that it has "long since ceased to be used."

But although the same constituents exist in the various Saratoga springs, they are so diversely proportioned, that what are the prominent and potential elements of one, have relatively small importance in another ; and thus the aggregate characteristics differ so widely, that we find among them quite dissimilar compound remedies ; and fair

* Bartholow, "*Materia Medica*."

representatives of almost every type of serviceable mineral water. And, strange as it may seem, the particular effect of the most prominent component appears to be invariably emphasized by the associated influence of the accompanying substances.

On the other hand, not a few of the most esteemed waters are so similar throughout; or the gradations are so finely shaded off, that a choice between them must rest upon convenience or empirical repute.

All are abundantly supplied with carbonic acid gas, the most important component of a mineral water; since, independent of its own special qualities, it brings into solution substances which would otherwise be inert, and renders the water attractive,

palatable, and easily digested. The quantity in the Saratoga waters varies from 25 to 65 cubic inches to the pint ; or about double as much as contained in most of their celebrated European rivals. It is especially valuable in the chalybeate waters, to which—as well as the milder alkaline and saline waters, such as the Patterson, Peerless, Royal, Kissengen, and Vichy—it imparts an exceedingly pleasant taste and grateful influence upon the stomach.

All contain chlorides of sodium and potassium—the chloride of sodium ranging, as grains per pint, from 88 in the Champion, 84 in the Carlsbad, 70 in the Geyser, 68 in the Congress, and 59 in the Hathorn, down to about 11 in the Red Spring, and 9 in the misnamed Magnetic.

All contain bicarbonate of sodium, the most active of the alkaline group, but the Vichy and Kissengen in greater quantities, both absolutely and in proportion to other ingredients.

All contain magnesium and calcium, but in very diverse proportions.

All contain lithium*—the Pavilion, Geyser, and Hathorn in greater quantity than *any* of “the lithia waters” so widely advertised—at least *four times* as much as most of them.

All contain iron, but in some it is the merest trace, scarce noticeable even as a tannate when mixed with wines and spirits, while the Columbian, Hamilton, Washington, and Pavilion are powerful chalybeate waters.

Almost all contain the iodide and bro-

* The older analysts probably failed to recognize it.

mide of sodium—the latter salt being especially noticeable in the Congress—but usually in quantities so minute that one might question the possibility of therapeutic effect, had it not been proven by clinical experience; and did we not know that foreign waters, by which distinct symptoms of iodism have been induced, possess no more than these.* The Carlsbad and Patterson contain bicarbonate of ammonia; and the Putnam and Patterson bicarbonate of manganese.

Almost all contain sulphate of potassium, alumina, silica, and barium; scarcely enough, however, to warrant the expectation of specific result, but

* Wildegg, to 16 oz., 0.218 of a grain.—*Madden, op. cit.* Kreuznach, Elise Spring, 0.035; Hall, 0.100; Krankenheil and Dürkheim, 0.010.—*Braun, op. cit.*

worth remembering when making choice between otherwise similar waters.

As in ordinary prescribing the secret of success—our ultra-scientific (?) German confrères notwithstanding—lies not so much in the selection of the single drug chiefly indicated in the disease, as in skillful combination with it of other remedial agents, which, without hampering its activity in the directions looked for, diminish the undesired consequences frequently unavoidable in the adequate exhibition of efficacious medicaments. So, in mineral waters nature presents us with endless combinations already prepared; but to their proficient utilization a somewhat converse talent must be applied.

The value of a particular substance

must be estimated, not only by the absolute quantities contained in a given measure of water, but also in conjunction with the other component parts of the same water, which are indivisibly associated with it. For example, one might gladly prescribe the grain of bicarbonate of lithium contained in about a pint of Geyser water, without desiring to administer the seventy grains of common salt, which must accompany it. Whereas, in another case this precise dose of carbonated saline water might be exactly what was indicated, while the presence or absence of lithium would be practically immaterial.

It is, however, also well before selecting a particular spring and determining the dose for a given case, to disassociate, and consider separately, the amount

and therapeutic significance of its principal components.

SALINES.—Chloride of sodium, or common salt, is the most universal ingredient of all mineral waters; being often most prominent even in those named after some other characteristic component. The considerable quantity shown in the analyses of the Saratoga springs might startle, and even repel, one unaware of its manifold usefulness in the workings of the economy.

The quest of salt, as a daily condiment, is one of the earliest and ingrained of human instincts; and more than any other has marked the advance from nomadic to civilized life. Its use is amply indorsed by recent physiological experiment. It is found to be by far the most constant and plentiful

mineral compound of the healthy body ; and is absolutely essential to its proper nutrition and general well-being. Omnipresent in the tissues, bones, and juices, it is largely concerned in the metabolism—both constructive and eliminative—which constitutes the active mechanism of life. Salt is a necessary constituent of the blood ; maintaining the solution of albumen and fibrine, while preserving the integrity of the blood corpuscles. It promotes osmosis, and wherever fluid transudation takes place, chloride of sodium is certainly present. It favors absorption, secretion, and elimination of all kinds—more especially, the excretion of urea. It increases the flow of gastric juice and bile ; contributing to the formation of the hydrochloric acid req-

uisite to the former. It is also an important factor of the saliva and pancreatic juice, thus assisting in the digestion of starchy foods. It prevents fermentation in the stomach and bowels; and maintains the solubility of the chyme, especially as regards albuminous and amylacious substances. In short, it appears to exercise a kind of antiseptic, and most beneficial, guardianship over the entire organism.

No wonder, then, that it should be eaten upon almost every article of food, and rank high among the "necessities of life." The normal human body contains about one-quarter of a pound of common salt,* and the average consumption by each person is supposed to range from forty to four hundred grains

* Lankester ; Dalton, " Human Physiology."

per day ; while in Russia, where, probably owing to the dirty habits of the people, there seems to be a still greater necessity for salt, and two ounces a day is not deemed excessive for those who can afford it, the divinely assigned paternity of the Czar has emphasized itself by laws monopolizing the production of that article.

Considered independently of other ingredients, and without reference to alteration of accustomed diet, from sixty to three hundred grains in the daily quantity of mineral water may be regarded as a dose. The minimum will usually suffice for general purposes, while any excess above the maximum figure would probably be followed by irritation of the stomach and bowels, and acute disturbance of digestion.

The chloride of potassium, present in much smaller quantity, seems to possess somewhat analogous properties, but is of relatively little importance. It is supposed by some recent physiologists to be mainly engaged in* retrogressive changes.

ALKALINE BICARBONATES.—Next in order, both as to quantity and remedial importance, comes the alkaline group : the bicarbonates of sodium, magnesium, calcium, and lithium. Physiologists fail to assign them any well-defined place in the workings of the healthy organism. Bicarbonate of sodium is believed to maintain the normal alkalinity of the blood, saliva, bile, milk, and mucous secretions ; and to assist the chloride of sodium in the solution of fibrin and

* Wroninch in "Schmidt's Jahrb."—*Braun, op. cit.*

albumen; lime is concerned in the formation and renewal of bone; and traces of each are found in muscles and other parts of the body.

It is, however, in the many *abnormal* conditions, dependent upon excess of acid in the system, that the bicarbonates exercise their highly corrective potency. In the state of perfect solution in which they exist in these mineral waters, they not only neutralize hyperacidity of the stomach and digestive tract, but they are rapidly absorbed into the blood and there rectify the morbid prominence of acids, which give rise to gout, rheumatism, many catarrhs, calculus, gravel, and the host of painful conditions. Each of the bicarbonates co-operates with the others in attaining this result. Even the bicarbonate of

lime, which has been regarded by some as a useless salt, has recently been proven on high authority * to exercise a particularly beneficial influence by its exceptionally high power of amalgamating with acids, and by interchanges with the alkaline phosphates of the blood, becoming itself a phosphate. It also improves the flavor of the water.

Bicarbonate of magnesia is perhaps the most perfect stomachic antacid; beside possessing a mild purgative tendency, which readily re-enforces the similar influence of chloride salts.

The exact position of bicarbonate of lithia is still difficult to define. Since

* Moriz Wagner, "Untersuchungen über die Resorption der calciumsalze"; Pfeiffer; Fürst, *Deutsche Med. Zeitung*, 1891.

the discovery, not so many years ago, of its easy affinity for uric acid, it has steadily grown in popular favor; and possibly its merits have been exaggerated. Nevertheless, it has been shown to unite with uric acid more readily than the other alkalies, and to form a compound more soluble and readily disposed of by the kidneys; and, even by those who declare it overrated, it is credited with the peculiar faculty of promoting the combining power of the other bicarbonates.* Clearly its presence cannot be overlooked, even in waters otherwise so favored as those of Saratoga.

The alkaline bicarbonates must be looked upon as purely *remedial*—invaluable in various abnormal conditions,

* Fürst, Ebstein.

but in no sense contributing to the nutrition of the healthy body, as does the chloride of sodium. They promote retrogressive change of tissue mainly; and consequently, if it were not for the corrective influence of the chloride of sodium, would tend, when long continued, to weaken digestion, emaciate the body, and diminish the amount of fibrin in the blood. But in the Saratoga waters the happy combination with carbonic acid, and generally with iron, as well as the chloride of sodium, counteracts their otherwise depressing effect; while the latter salt performs yet another important function in favoring the safe elimination of the various alkaline urates formed by the union of the bicarbonates with uric acid in the blood; which might other-

wise prove as undesirable as the uric acid itself.

The therapeutic uses of the prominently alkaline waters being mainly with the acid dyscrasiæ of gout and rheumatism, and in certain forms of dyspepsia and renal diseases, may appropriately be discussed more fully when considering those conditions in a future chapter.

The value of both chlorides, alkalis and gas, in external application, is considered in the chapter upon *Baths*.

IRON.—The chalybeate springs of Saratoga are in every respect among the finest in the world. They contain about five and one-half grains of bicarbonate of iron to the gallon, which is an unusually large amount; but, as with other distinctly characteristic

waters, the utility of the leading component is not so much to be determined by the quantity present, as by its combination with other ingredients, and consequent digestibility. The copious impregnation with carbonic acid gas, already alluded to, contributes largely to the excellence of these waters; for, not only does it increase the solubility of the iron itself—thus making it infinitely more potent than proportionate doses of any pharmaceutical preparation—but it facilitates its amalgamation with the alkaline and saline components, conceals the inky ferruginous flavor common to chalybeate waters, and renders these sparkling, piquant, and easily assimilated.

Indeed so palatable are these waters that a word of warning is necessary to

those who, unaware of their medical potency, might be tempted to use them too freely.

Iron is not, as most medicines, a substance foreign to the normal organism. Like the chloride of sodium, it exists in many parts of the healthy body, and no doubt performs an important office. It is a material element of the hæmatin, which cannot be formed without it ; and also of the red corpuscles, which represent the life supporting function of the blood, and have been proven to diminish rapidly in numbers when in need of iron.*

In health, the ordinary mixed diet provides enough for all purposes ; but during and after exhausting illness, severe hemorrhage, or similar depress-

* Bartholow, *op. cit.*

ing influences, the want of iron is plainly manifest ; and is usually accompanied with such loss of vigor in the digestive and assimilative functions, that it cannot be supplied in the usual form of nutriment. Administered by the preparations of the pharmacopœia, the stomach is often intolerant of its presence, or it passes away unabsorbed in the stools.

By these chalybeate waters, on the other hand, the iron, owing to its absolute solution, is not only readily absorbed—thus contributing directly to the formation of red blood—but when judiciously used promotes digestion, increases the disposition to consume blood-producing foods, and the ability to utilize them. To which ends it is seconded by the accompanying salines,

which—not like the sulphate salts—show for it a marked affinity; and further, by their laxative tendency, avoid in most instances the necessity of purgatives, so common during an ordinary course of iron.

From these considerations, may be inferred how invaluable is a perfect chalybeate water in the long list of infirmities in which iron would be indicated in everyday practice; that is, in all conditions in which anæmia is a prominent characteristic: in chlorosis, protracted convalescence from severe illness, or surgical operations; in all forms of hemorrhage, bad confinements, and over-prolonged lactation; in almost all derangements of the menstrual function—amenorrhœa, of the anæmic type, as well as menorrhagia;

in exhausting catarrhs of the uterus and mucus membranes ; in the scrofulous, malarial, and specific cachexiæ ; and in the host of other maladies in which imperfect performance of function, general want of tone, and debility, indicate poverty of blood. It is interesting to note that the more recent and direct is the cause of anæmia, the more readily is the iron taken up, and utilized by the system.

Valuable as are these waters, it is essential that all who partake of them, or counsel their use by others, should fully realize that they are not alone a pleasant beverage, but more particularly a powerful medicament ; which, indiscreetly used, is just as potent for evil, as, under suitable circumstances, it might be for good.

Chalybeate waters are contra-indicated in a very considerable portion of cases: in all forms of plethora, especially in short-necked, full-blooded persons, with a proneness to rush of blood to the head, and in the hyper-sanguineous temperament in general; in chronic stagnate conditions of the brain or cord, nervous hyperæmia, accompanied with vaso-motor irritability, and a tendency to hemorrhage or local congestions; and in all cases where there is reason to suspect the integrity of the blood vessels. In all such conditions the chalybeate waters might prove actively dangerous; and even Saratoga—absolutely safe as one might be led to consider the waters, from the reckless use of them which is constantly going on, without much apparent harm—is not

without its traditions of serious mishap. Even in suitable cases, or in perfect health, the excessive use of the stronger chalybeate waters is apt to produce unpleasant symptoms: excited cardiac action, cerebral congestion, mental confusion, pain in the head and dizziness; and there are some persons who show marked repugnance to iron in any tangible form. Under no circumstance can anything be gained by large doses; for, it is an established fact that the blood cannot be forced to take up more iron than its normal amount—about forty-five grains—and the deficiency, no matter how caused, can seldom exceed ten to twenty grains.* Any attempt

* Halliburton, "Chemical Physiology"; Dalton, *op. cit.*; one part of iron to 230 of red globules, Gorup-Basanez.—*Bartholow*.

to introduce more than this quantity, merely impedes that, which in smaller doses, would have been absorbed and utilized. One grain of iron contained in about a pint and a half of the Columbian or Hamilton springs, taken in at least three parts throughout the day, may be regarded as amply sufficient for any indication; and about one-third of that amount as suitable for the average case.

WATER.—In a detailed estimate of the component parts of a mineral water, one is apt to overlook that which is not only essential to the utilization of all the others, but, by its own merits, frequently contributes most to the beneficial results of an hydriatic course — *the water itself.*

Few persons, even among those con-

spicuous in discussing medical topics, realize the diatetic value of water, or give thought to the elementary truism, that two-thirds of the human body are composed of that commodity.* It is abundant in the blood, and in all the secretions, contributing from eighty to ninety-nine per cent. of the entire volume of the latter; while not less than fifteen or sixteen pounds of water circulate in the blood of the average sized person.† It constitutes about seventy per cent. of muscle, and proportionately of all other animal structures.

Not only is water thus preponderant in quantity, but it is the most indispensable element in all the complex phenomena of life. It maintains the fluid-

* Dalton, *op. cit.*, *et al*, 70 per cent.; Halliburton, *op. cit.*, 58.5 of the adult, and 66.4 of the infant.

† Weber and Lehmann, "Physiological Chemistry."

ity of the blood and juices, requisite for the solution of their component material, and the healthy performance of function. It is the vehicle by which nutrient matter is carried into the circulation, and thence applied to the sustenance of the body; but, even while nutrition is occurring, destructive changes are taking place simultaneously, and hence, water is again necessary for the solution and discharge of used-up material. In fact, water is essential and subservient to every vital process of the organism: to chemical union and decomposition, to digestion, absorption, transudation, nutrition, secretion, and elimination; and, consequently, needs continual replenishment, in order that its multitudinous duties may be efficiently performed.

Physiologists * calculate that about two quarts of water per day, taken into the system either as fluid or a component of solid food, is requisite for the ordinary adult. Which amount—or, strange to say, even a little more, supposed to result from the union of its chemical elements within the body—having formed an integral part of all the animal tissues, and become laden with the effete products of retrogressive change, is daily discharged by the kidneys, skin, lungs, and bowels.

There are times, however, by no means infrequent, owing to injudicious diet, lack of exercise, or other causes inherent to our civilization, when this ordinary circulation of water seems insufficient for the purposes of the econ-

* Barral, Dalton.

omy ; when morbid materials have accumulated in the blood and tissues, which, unless eliminated, are sure to manifest their presence in some form of ill-health. Under such circumstances, the copious imbibition of even ordinary water, without any medicinal ingredient, will, if tolerated by the stomach, usually answer the indication to a marvelous degree ; for not only does the unaccustomed supply of water directly stimulate the excretory organs, but the increased fluidity facilitates a semi-mechanical flushing-out of the entire system. It has been demonstrated experimentally* that water introduced into the stomach, especially when of moderate temperature, is rapidly absorbed into the blood, and almost immediately

* Becquerel, Genth, Mosler, Braun.

followed by increased secretion of all kinds—of saliva, gastric and pancreatic juices, bile, perspiration, exhalation, and urine; and not only is the volume of fluid augmented, but also, very largely, the quantity of normal solids. For instance, of the urine, it has been proven that unaccustomed plentiful water-drinking, although actually diminishing the amount of uric acid, will increase, not only the quantity of water, but also the aggregate of other solids—mainly urea, by twenty to twenty-four per cent. in twenty-four hours.

From these considerations, it will be seen how important is the regular consumption of fluid. The habit, especially common among young ladies, of deluging the stomach with iced water, is unquestionably injurious—producing

chronic congestion, gastric catarrh, and dyspepsia, and thus seriously impairing general nutrition ; while, on the contrary, the moderate use of fluids—of water, when it can be obtained free from the organic impurities so dangerous in the surface-collected waters of cities, or of light wine at meal times, especially as an adjunct to animal food—promotes digestion and sustains health. For those unable to exercise freely, a liberal supply of water is particularly desirable ; and, it should be remembered, that on account of its gentle stimulating quality, the stomach will bear without distress, a much larger quantity of gaseous than of plain water.

In the present treatise, however, we are concerned less with the dietetic uses

of water, than with its special influence as the main factor in an occasional course of mineral hydrotherapy; and the agent by which important medicinal substances are conveyed into the system. Anyone who has had the patience to study the previous pages, has at least acquired this rudimental principle in the scientific utilization of the Saratoga, or any other mineral waters: that even when considered separately, the main tendency of the water itself, as well as of its principle ingredients, is to promote tissue change, or *metabolism*; and that when taken conjointly, in the form of a natural mineral water, they so mutually re-enforce each other, that a powerful influence is exercised in this direction.

CHAPTER VI.

METABOLISM, AND ALTERATIVE EFFECTS.

FOR the benefit of the non-medical reader, it may be well, at this point, to interpose a word of explanation of the term just used, which, although by no means generally understood, has already, more than once, crept into this work, and will be frequently and unavoidably used hereafter. The vital process, or combination of processes, variously described as, change of tissue, tissue metamorphosis, or *metabolism*, includes almost all the mechanico-chemical operations inherent to animal life: respiration, circulation, alimentation, nutrition, and excretion; the

mysterious association of function, by which substances of certain quality are taken into the body as food, digested by the ferments of the alimentary canal, assimilated and absorbed into the blood, given off again to support the structures of the body, and ultimately converted into heat, force, vitality, and *life*. In every living organism there simultaneously progress a building up, and a tearing down of tissue: a constant interchange of used-up, for utilizable material. A certain energy is expended in the process of excreting and getting rid of the effete products of combustion, which, having fulfilled their parts in nutrition, are no longer of use in the system—this process is *retrogressive metabolism*. The loss so caused is compensated for by

the in-take and assimilation of new substances, which are as constantly devoted to the recuperation of the economy—this process is *progressive*, or *constructive metabolism*. Any sluggishness or impairment of either or both of these great functions—whether the result of defect in some particular organ, or a general dyscrasia, such as malaria, scrofula, rheumatism, gout, or specific infection—soon manifests itself in some form of ill-health.

And here, may be appropriately defined yet another term inevitable to our subject, but, which seldom conveys any definite meaning to the non-professional mind : an *alterative* is a medication, or an influence, which without purgation, diuresis, or other noticeable excess of secretion, or antecedent

phenomena of any kind, restores to its normal condition the disordered process of metabolism. It is mainly *because* of their *alterative* quality, that the Saratoga waters are so superlatively valuable in almost every form of chronic disease—in all of an indolent character. It is equally, *because of their stimulating influence upon metabolism*, that they are usually contraindicated in malignant, wasting, or inflammatory ailments; or where increased constitutional activity might be injurious.

If excuse be needed for the possibly tedious physiological details of the previous pages, and the frequent reference to metabolism in those to come, let it be plainly stated, that without at least as much knowledge of these

matters as here conveyed, the scientific, or even rational, use of mineral waters would be absolutely impossible ; and one might as well, at the outset, take council with the hall-boy, or the advertising circular of almost any spring. All are sure to name the complaint of immediate interest ; since all lay claim to curative powers in well-nigh every disease in the nosology. Take but a single example. There is scarcely a mineral spring anywhere upon the face of the globe, which does not pretend to cure rheumatism—and yet what widely different conditions are included under that single term. Who can suppose that the remedy, which would benefit an ancient and dried-up valetudinarian, suffering from

a chronically stiff hip-joint, could be at all suitable, or otherwise than deleterious, to a young person with high fever, and acute inflammation of the heart and pericardium; *yet both may be suffering from rheumatism.*

Under ordinary circumstances the Saratoga waters, taken in sufficient quantity, produce purgation, diuresis, diaphoresis, and other soon manifest effects upon excretion; which are usually highly advantageous, especially when commencing a course—but any or all of which might, in most instances, be as well attained by a suitable prescription dispensed according to the pharmacopœia. It is not, therefore, upon such results alone—however useful under certain conditions—that the deservedly high reputation of these

waters depend. It is rather upon their secondary, or alterative effects, in the innumerable chronic conditions of ill health—none the less serious because ill-defined—consequent upon vitiated blood, or some morbid constitutional tendency, defective digestion, imperfect nutrition, or partial failure of any of the vital functions included under the general term metabolism.

Here is the sphere in which mineral hydrotherapy stands absolutely without a rival; where a properly directed course of Saratoga waters—whether taken internally or used as baths, or both at the same time, or alternately as circumstances dictate—will often succeed in restoring health, even when the ordinary methods of sound practice

have proved ineffectual. But to obtain these happy results, with the approximate regularity of ordinary scientific treatment, we must adopt the same careful system of prescribing: we must abandon the happy-go-lucky empiricism of sending patients to springs, of whose constituents and mode of action we know little, simply because others are said to have been cured of like-named ailments—but of what type or special characteristics we know nothing; and finally, we must fully recognize this fundamental principle of rational hydro-therapeutics: that, in their most precious capacity, mineral waters seldom act directly as specifics for disease, but rather as correctives of the constitutional conditions, which give rise to and maintain it; and, con-

sequently, although the good effects may not be immediately evident, *they are reliable*; and will be found more *permanent* than those obtainable by other means.

Indeed, in many cases, the benefit experienced from a course of mineral water is more marked after, than during, the treatment, although none the less attributable to it. And this is why many of the same persons year after year visit Saratoga, not so much attracted by its gaieties and pleasant life, or even the prospect of immediate relief, as to obtain a fresh supply of health, sufficient to last them over another year.

It naturally follows, that just in proportion as we recognize the remedial value of these waters, we must regard

them as medicaments, not to be indulged in as an ordinary beverage, or without considering their therapeutic effects, and the requirements of the individual constitution. There can be no doubt that reckless or ill-advised potation of the stronger waters has led to unpleasant consequences ; and subsequently, to unjust condemnation of the springs, by persons who should rather have blamed their own stupidity. Even the delicious milder waters, although scarcely capable of serious harm, under ordinary conditions, are so well equipped with gas and minerals, that they should not be partaken of without reference to the state of digestion, and other circumstances. The hospitable friend, who at the cost of five cents, would insist upon treating

you to a glass of Vichy, is asking you to consume close upon fifteen grains of alkaline bicarbonates; which may be precisely what you need to correct the hyper-acidity of your stomach; but, if the circumstances are otherwise, he might, with at least equal propriety, invite you to a quinine pill at the drug store, or to name your choice refreshment elsewhere.

The special conditions of ill-health to which the Saratoga waters are scientifically applicable in accordance with the analyses, or, in which the happy experience of thousands has accorded to them a well merited reputation, will be more fully discussed in a subsequent chapter; where, will also be found some instruction in the best method of using them, and the auxiliary

conditions most favorable to a successful issue.

Meantime, it is desirable that the reader should understand something of the physiology and therapeutic influence of mineral baths, which in many ailments are scarcely less important than the drinking of mineral water, and for the use of which there are excellent opportunities at Saratoga.

CHAPTER VII.

BALNEOLOGY, OR THE SCIENCE OF BATHING.

THE use of mineral baths forms an important, although much neglected, branch of hydrotherapy. In no other part of our subject does so much uncertainty and contradiction prevail; or, is it so often difficult, even for those thoroughly well-informed, to reconcile the clinical results empirically obtained, with any rational theory of physiology or animal chemistry.

In all ages baths have been esteemed as valuable in promoting health and combating disease; but, until comparatively recently, there has been scarce an

effort on the part of physiologists to explain their beneficial effects, or demonstrate the method of their action ; and, even among physicians, there still obtains a wide ignorance of the technique of scientific bathing.

First, a word upon the conditions common to bathing generally, whether with ordinary or mineral water. Aside from the special advantages of cleanliness—which, naturally are of the first moment, since the skin is one of the most important, and probably the most diversely functioned of human organs, and a healthy skin is impossible without cleanliness—baths may for practical purposes be divided now, as they were by Hippocrates, into two classes: (1) *Tonic or Stimulating Baths*—consisting of cold water, or warm water quickly

followed by cold, and taken either as the full bath, plunge, douche, shower, sponge, or needle bath ; and (2) *Sedative Baths*—of lukewarm, tepid, or hot water, vapor, or air ; and taken in the ordinary bath tub, or sitz bath, or as Russian or Turkish baths, or as sprays, jets, the wet pack, or hot compress.

The conclusions of recent investigators* may be somewhat tersely summarized as follows: The primary effects of a cold bath, no matter how administered—or, indeed, of cold in any form applied to the surface of the body—are to induce contraction of the external blood vessels, to accelerate the

*Liebermeister of Basel, Röhrig, Zuntz, Colasanti, Finkler, Voit, Rembold, Winternitz, Delmas Saint-Hilaire, Jürgensen, Bartels, Pfluger, Thompson, Braun, and others.

pulse and rate of respiration, to increase the secretion of urine, the excretion of carbonic acid, the consumption of oxygen, accompanied by augmented tissue metamorphosis—the decomposition of non-nitrogenous matter, and the conversion of fats; and, lastly, to heighten the external expenditure and internal production of heat.

The increased elimination of carbonic acid is very large, sometimes as much as four or five hundred per cent. ;* and, although the loss of heat usually exceeds its increased production, so that the mean result is a lowering of bodily temperature, an exception may occur when the cold applied is very intense—thus stimulating actively the heat-producing function—but of such momen-

* Braun.

tary duration, that little pre-existing heat is abstracted.

Under ordinary circumstances, the measure of these effects is in direct proportion to the degree of refrigeration—which may be regarded as the index of peripheral irritation—but inversely to its duration. In most cases, however, reaction soon takes place, a new set of phenomena of precisely opposite character are manifested, and before long the opposing conditions have equalized one another, and systemic equilibrium is restored. But, if the cold is so intense that the initial stimulus merges at once into depressing shock, or so prolonged that the aggregate temperature of the bather is considerably reduced, then the effects are precisely contrary to those just described, and in

addition, there occurs increased decomposition of azotized substances, and excretion of urea.

Experiments in the physiology of tepid and warm baths give less notable results. In the warm bath, of ordinary temperatures, the primary changes are not so marked as in cold bathing, and are naturally of opposite character. When, however, the bath—whether of air, vapor, or water—is extremely hot, or so long continued that the internal temperature of the body is materially raised, the phenomena presented resemble in many respects those noted in the *early stage* of moderate cold bathing; but, instead of rapidly reacting, these increase in proportion to the duration and intensity of the bath.

This curious similarity of the primary

changes in the temperate cold bath, to the secondary ones of the extreme hot bath—the difference lying in the subsequent appearance or non-appearance of *reaction*—renders the physiology of balneo-therapeutics somewhat complicated ; but readily emphasizes the fact that considerable intelligence must be exercised in the choice and direction of baths, in order to obtain, in every case, the desired result.

Under suitable conditions, and properly applied, the constitutional effect of a cold bath is exhilarating, and unquestionably beneficial. There is a peculiar and delicious sense of invigoration, and increased muscular force ; which latter is especially interesting, as it has been shown that the reflex tissue changes take place very largely in the

muscles.* The mind is also refreshed. There is a feeling of buoyancy, and readiness to undertake exertion, psychical as well as physical; and although, as has been said, the aggregate temperature of the body is usually lowered,† in consequence of the loss of heat during the bath exceeding its increased production, yet, there is experienced a pleasant sensation of expansive warmth—the manifestation of physiological reaction from the stimulus of cold.

Except in the treatment of fever—a discussion of which would lead beyond the scope of this work‡—when it may be desired to reduce perma-

* Bell, *Jour. Bal. and Diet.*

† Braun, tran. Herman Weber.

‡ Currie, Brand, Ziemssen, Winternitz, J. C. Wilson, and others.

nently an abnormal pyrexia, the substantial benefit of the cold bath lies, not so much, in the immediate physiological effects, which are exceedingly transient in character, as in the vigor and persistency of the *reaction*.

This, when practiced regularly, affords to the blood vessels, and the great system of sympathetic nerves which control them, a kind of calisthenic exercise, eminently salutary ; and prophylactic against dangerous congestions of mucous membranes or internal organs. It stimulates and strengthens the heart,* lungs, nerve-centers, and muscular system. It improves the appetite, augments the functions of the skin, kidneys, and liver ; and by the elimination of carbonic acid, and the effete products

* Winternitz.

of tissue combustion, improves the quality of the blood.

But like all remedies potent for good, the cold bath is not without danger when unwisely handled. When from any cause, whether general debility or disease of internal viscera, the system is incapable of rapid and effective response, cold in any form is hazardous. Cold baths are contra-indicated in almost every form of advanced organic disease, especially of the blood vessels, heart, kidneys, liver, or spleen ; except, perhaps, when many years of favorable experience may justify their continuance, but even then, it should be in modified form, and with great caution. Those unaccustomed to cold baths, and old persons in whom the arteries are

liable to be weakened, should never commence their use without competent advice.

As a matter of fact, cerebral apoplexy, congestion of the lungs, and similar dangers, so dreaded by those unfamiliar with the subject, are rarely observed ; but, occasionally, reaction is exceedingly difficult to establish—most frequently when the bath has been overprolonged—and, imprudent bathers may remain for hours in a state of alarming depression, the result of primary shock, or too protracted cooling. The colds of everyday life are more likely to arise from a passing draught of air, accidentally wet feet, or some like apparently trivial cause, than from the most extreme hydriatic procedures : a circumstance explained by Braun, “be-

cause, most colds arise from cold locally applied, and the more locally limited is the refrigeration of the skin, the less is the general production of heat and reaction." Indeed, it may be stated, that regular cold bathing, by educating the peripheral nerves and vaso-motor system to withstand temperature changes, is the very best preventative against the ordinary catarrhs of our trying climate.

To advocate a therapeutic measure, and then so limit its applicability as to exclude almost every condition of disease, may appear paradoxical; but such would be the fate of any other remedy, no matter how valuable, if considered individually, in reference to an equally wide range of maladies. It should be easily understood, from the foregoing synopsis of the physiology of the cold

bath, that, as its *modus operandi* in strengthening and curing is to stimulate and intensify vital functions, a certain textural integrity of the organs, responsible for those functions, is essential to a satisfactory result. It follows, and experience amply demonstrates, that in the chronic diatheses, such as gout, rheumatism, or scrofula, in the earlier manifestations of tubercle, and other conditions dependent largely upon disordered function and defects of nutrition, cold baths are capable of immeasurable good.

MINERAL BATHS.—The previous remarks, and those to follow upon the *technique* of balneology, apply, almost equally, to bathing with ordinary as with mineral water.

Now, to determine the reason of the

unquestionably greater curative efficacy of the latter.

Theoretically it rests upon credence in the capability of the cutaneous surface to absorb salts and gases—a doctrine unreservedly accepted in the past, and abundantly proven of salts, when applied as unguents or liniments. It gives a comprehensible explanation of the best results observed, and, therefore, has been loudly advocated by those financially interested in mineral springs. Nevertheless, experiment, although proving the absorption of gases,* throws grave doubt upon the possibility of any tangible amount of mineral matter being taken into the system in this way.† On the other

* Martigny, Lebküchner, Krause, Gerlach, Braun, etc.

† Kletzinski, Lehmann, Hérbert.

hand, we have the accumulated evidence of all times, that baths of certain mineral impregnation have a curative potency, distinct from and beyond, the effects of simple water ; and not explainable as cutaneous stimulation alone—although, no doubt, an important factor.* Braun remarks : “ The question of absorption remains an open one, and the one fact alone seems to be satisfactorily proved, that absorption, if it does take place in the bath, can only be small in amount.” It is worthy of consideration, however, that no matter how minute may be the quantity of saline matter absorbed by the skin, such as it is, it passes directly and unchanged, into the circulation ; and thus may induce therapeutic results entirely

* Röhrig, Zuntz.

out of proportion to the same, or many times a greater, quantity taken by the stomach. Unquestionably, too, the bicarbonate of soda, and other alkalis, produce a salutary, softening influence upon the skin, probably by chemical solution of its secretions and the scales of the epidermis; thus, augmenting in a high degree the healthful function of that important organ.

The ocean itself is a great reservoir of mineral water, and, except in lacking gaseous impregnation, is by no means dissimilar to the stronger saline waters of Saratoga, or the world-famed sool baths of Europe; yet, who will combat the universal belief that sea-bathing possesses virtues unequaled by fresh water, or the time-honored

tradition that "a wetting by sea water does not give cold."

THE HYGIENIC COLD BATH.—A morning plunge in the ordinary bath-tub, or the shower, or English sponge bath, are the best methods of regular hygienic bathing. A rational temperature ranges from 75° or 80° F., down to 45° F.; but a bath of about 60° F. will usually give the most salutary result to the average constitution. Exceptionally robust individuals, commonly those accustomed to active country life, may habituate themselves, without detriment—so long as they remain organically sound—to very much lower temperatures.* There can be

* Recently a medical writer described his personal experience of twelve years with cold river baths in winter. The bath was taken between six and seven o'clock in the morning, and even when the thermom-

no doubt, however, that the unaccustomed, and ill-advised, use of excessively cold water is capable of serious injury; and has done much to mar the popularity of cold bathing, and foster deep-rooted prejudice against its reasonable employment.

The most assured results will be obtained by moderation; and, there being no certain guide, beyond experience, to the reactive capacity of an individual, it is wise to commence with milder hydriatic methods, such as a

eter was as low as 10° F. On windy days he was able to dispense with a towel, and dry himself by walking up and down in the breeze. This apparently suicidal procedure produced in him an agreeable effect.—*Ny. Medicinische Monatschrift*, July, 1891. But doctors differ: not long since a physician of Iowa remarked at a scientific meeting, "that the people of his State bathe but once a year, and yet they have a minimum death rate!"—*The Post Graduate N. Y. Medical Record*, March 5, 1892.

shower or sponge bath at a temperature not lower than 80° F., and then proceed gradually—sometimes after an interval of several days—to the more severe.

Mineral water, on account of its extra stimulating qualities, may be used colder than plain water ; and the shower, rain, or sitz bath, than when the entire body is immersed.

The period of immersion should seldom exceed two minutes ; and usually the fullest benefit may be derived in less than one-half that time. It is a good method for those in average health to stand up in the bath after the the first fifteen or twenty seconds' immersion—rub the body briskly, soap being used if desired, and the nature of the water permits it—and then take

another plunge, with continued active rubbing under water. Thus is obtained the benefit of a second reaction, together with thorough cleansing of the skin.

It is important that all forms of cold bath should be taken in a moderately warm and well-ventilated room; and immediately followed by brisk friction with a rough towel or flesh brush. The skin and nails should show a reddish tint: any bluish or mottled appearance indicates that the reactive powers have been overtaxed, and consequently the bath injurious.

The custom of returning to a warm bed after a cold bath, recommended at some German Spas,* seems justified

* Teplitz, Ragatz, Wildbad, Warmbrunn, Wiesbaden, and others.

by no sound reason. For the healthy fresh air, exercise, and a good breakfast would be more salutary; and, when the object is to promote perspiration, this can be better attained by a hot vapor bath or wet pack.

A cold bath should never be taken after a heavy meal, but a cup of coffee or other light refreshment before the morning bath is, for delicate persons, by no means undesirable. A cold bath is also contra-indicated in excessive fatigue, or when the body is perspiring, or is chilled, or exhausted from any cause. After violent exercise it is prudent to rest for half an hour, or first take a warm bath, which produces much the same effect, before shocking the system with cold.

When only one bath is taken each

day—and this is usually sufficient, except under special advice, as treatment for definite disease—the morning, immediately after rising, is *decidedly the best time*: not only, because it is usually the most convenient, and the system is rested and ready for reactionary gymnastics, but also, because it is the time of the twenty-four hours (between 7 A. M. and noon) when the natural heat of the body is approaching its maximum point. If a second cold bath is indicated, it should be taken from one to two hours before dinner, so as to allow at least half an hour for absolute repose. If taken late at night the reaction may interfere with sleep, although, as will be seen later, the tranquilizing effect of the lukewarm bath or wet pack tend to promote it.

It is a common error to suppose that only persons of active habits and robust constitution may advantageously use the cold bath. On the contrary, those who are by nature feeble, or persons obliged to lead an enervating, sedentary life, derive even greater benefit from its judicious employment. To such, it is the very best general tonic, substitute for exercise, conservator of health, and prophylactic against the diseases to which they are especially liable ; but naturally, in these cases, extra care must be exercised in matters of technique ; and it should be borne in mind, that, as in all applications of heat and cold, absolutely contradictory results are apt to follow apparently similar procedures ; the effect *not* desired may ensue from neglect

of some seemingly unimportant detail.

THE HOT BATH.—Little need be said of the positively hot bath; by which is meant submersion, for an appreciable time, in water at a temperature of from 105° to 120° F.

Unless extreme in heat, and consequently injurious, the physiological effects of such a bath, are of slight consequence to those in health; and only in some forms of rheumatism, and rare emergencies—such as the passage of a calculus, irreducible hernia, retention of urine, or when it is urgently desired to draw blood to the surface, in order to relieve sudden congestion of internal organs—are they of remedial importance in disease. Besides the extremely hot bath is familiar, and already too popular, in many

households ; and even when used by the healthy, for purposes of cleanliness, claims rather a word of caution than of advocacy. While cold bathing is, as a general experience, more appreciated by men than by women, the habitual use of very hot baths is frequent among ladies ; and, unless followed by a cool douche or shower, which is seldom the case, is decidedly injurious—debilitating to the nervous system, relaxing to the muscles, and subversive of graceful contour.

On the contrary, *the warm bath* (from 95° to 102° F.), in every form, has a wide range of therapeutic usefulness ; and, paradoxical as it may seem, is often applicable to the same class of cases for which cold bathing has already been recommended.

The fundamental purport of both

cold and warm bathing is the same—*i. e.*, to *promote function*. Cold accomplishes this end by stimulating latent force into activity; *warmth*, by physically facilitating the defective performance of organic life. Cold contracts peripheral blood vessels, increasing arterial tension, but, as a secondary effect, expands them; warmth relaxes at once. Baruch * remarks, that, “by means of hydrotherapy we may exercise perfect control of the pressure and distribution of the blood.” True, in a great measure: but, at times, it is no simple task to elect the method most likely to give the result desired. As, in localized inflammations, one may hesitate between the ice-bag and the more conservative system of hot fomentations

* “Syst. Pract. Therapeutics.”—*Hare*.

and poultices ; so, under some circumstances, it needs an educated judgment to determine whether a given constitution possesses sufficient reserve vitality to profit by a refrigeration, demanding strong reaction, or, whether it is wiser to rest content with making easier the imperfect efforts of nature, by the immediate application of warmth.

The salutary administration of cold presupposes sufficient structural integrity of visceræ to insure benefit from rapid changes of vascularity, and sufficient capacity for internal heat-production to compensate for the pre-existing heat abstracted in the bath. Warmth, on the other hand, makes no such demand. It takes nothing from the organic force inherent to the individual, and, at the same time, although in a

lesser degree, serves the same therapeutic purpose. For this reason, it is suitable to the majority of persons who seek professional advice, and to whom cold bathing would be contra-indicated by some of the conditions already stated.

WARM MINERAL BATHS.—No thermal springs have yet been discovered in this section of the country—the highest natural temperature in New York State being 75° F., at Lebanon.* They abound, however, in the Western States and other parts of the world; notably on the continent of Europe, where they are much esteemed in the treatment of chronic gout, rheumatism, scrofula, skin diseases, and a variety of other complaints; but, the technique usually

* Peale, United States Geographical Survey.

occupies more time than even the average health-seeking American would be willing to expend; and, in many places, leads to social institutions not likely to become fashionable here. For instance, at Leukerbad, "gentlemen and ladies bathe together in reservoirs adapted for about twenty persons, beguiling the time with conversation, reading, taking luncheon, and playing dominoes on floating boards. The bathers, attired in woolen mantles and capes, in this manner avoid the *ennui* otherwise unavoidable."*

The Saratoga waters are naturally cold (from 40° to 52° F.); but may be heated to any point desired with practically no change in mineralization, and a loss of gas so insignificant that, even

* Braun.

after the heating process, these waters still contain about double as much as the most celebrated thermal baths of Europe. The Schwartz system of bath-tub, extensively used at foreign resorts with the view of lessening the escape of gas during the heating of naturally cool water, is therefore unnecessary here ; and, as the notion of "a telluric, or electro-volcanic" heat, with specific properties dissimilar from those of ordinary heat, exists only in the imagination and parlance of the spa charlatan, it is ridiculous to assert, that the heating of these waters, being artificial, detracts in any respect from their remedial potency, as compared with naturally hot baths.

Indeed, the Saratoga waters are so highly saturated with gas, that, under

some circumstances, its excess may become an element of danger. Carbonic acid, when taken in the stomach, or absorbed through the skin, is usually an exceedingly valuable stimulant, but when respired by the lungs it is always injurious—causing difficulty of breathing, dizziness, cardiac oppression, and ultimately asphyxia. The heating of the bath favors its escape, as also do the movements of the submerged body; and refreshing as it may seem to agitate the sparkling water, and watch the bright bubbles rising to the surface, it must be remembered that when they pass off into the atmosphere, and are inhaled by the lungs, the injurious results will go far to counterbalance the beneficial stimulation of the cutaneous surface. It

is, therefore, desirable that the bath should be well stirred up, or allowed to stand for a period before use, so as to permit a moderate loss of gas; or, better still, that the bather should remain quiet during immersion, in order that the carbonic acid may be absorbed, and act freely upon the peripheral nerve filaments, without largely vitiating the respired air. Baths of carbonic acid gas are given at Rehme, Franzensbad, Marienbad, Kissengen, and other places. The body is inclosed in a reservoir filled with gas, the head only being excluded. Such baths could just as easily be administered at Saratoga, but are of no special value.

In point of mineralization, the waters of Saratoga are very similar in constituents, and usually quite equal in strength,

to many of the most celebrated natural sool baths of Europe.* They contain over one per cent. of chloride salts, which is double as much as many of high repute abroad, and amply sufficient for most general purposes. But if, as in certain cases of unusually torpid skin, scrofulous or rheumatic exudations, or similar conditions, a stronger solution is desired, there is no reason why the bath should not be artificially strengthened at Saratoga, as is customary at Baden-Baden, Kreuznach, Rehme, Elmen, Arnstadt, Wittekind, Pyrmon, Cannstadt, and other famous watering places abroad. This may be done, up to three or four per cent. with common salt, or the combination of salts natural

* Kreuznach, Aix-la-Chapelle, Spa, Baden-Baden, Wiesbaden, Soden, Kissengen, Hall, Homburg, etc.

to the waters obtained by evaporation, or, what is known at European Spas as "Mother-lye" (Mutter läuge), that is, a highly concentrated solution of the chloride salts, from which much of the chloride of sodium has been removed for commercial purposes.

Warm baths of the natural Saratoga waters are beneficial in a wide range of chronic diseases. Almost equally with cold baths they stimulate all the functions—increasing the appetite, improving digestion, and facilitating the elimination of effete or morbid material through the lungs, skin, and kidneys. But, as has already been stated, it is impossible to do more than generalize in matters of technique, which may be indefinitely modified, and adapted to the powers and requirements of the

individual constitution. The temperature, strength, duration, and frequency of the baths, and the length of time it is wise to continue a course without interruption, are all points which must be determined separately for each particular case ; and will largely depend, not only upon the nature of the disease, and constitutional condition of the sick person, but also upon the effects first produced, which should be carefully observed from day to day.

From 90° to 98° F. is usually warm enough ; as on account of the stimulating qualities of the gas and minerals, which are appreciated by the skin as a kind of textural unctuousity, these waters can be borne with comfort at a much lower temperature and for a longer time than ordinary water.

The duration of the bath cannot in every instance be prescribed beforehand, but may range according to the circumstances, and the sensations of the bather, from ten minutes to half an hour or more. At Aix-les-Bains, Wildbad, Gastien, Rehme, and other European bath resorts, an hour is the usual time; and using a mild water, such as the Red Spring, would not be too long. There is no limit to the duration of a bath of ordinary warm water, so long as the temperature is maintained; but it should be remembered, that long continued mineral baths might become injurious, not only by too powerful cutaneous stimulation, but also through the amount of carbonic acid unavoidably inspired. It is well to commence a course of mineral bathing somewhat

cautiously, until the effects have been noted, especially in cases where too stimulating an influence is not desired : say, a bath at 98° F., of ten or fifteen minutes, every alternate day, until three or four have been taken ; and subsequently, every day for some weeks, the temperature being gradually lowered and the duration increased ; or, if circumstances permit, and continuous betterment is experienced, every second day throughout the entire season. As a rule, the sensations in the bath are exceedingly pleasant, and independent of benefit to any special ailment, the skin becomes soft and white, and the general health is improved. To drink the waters and bathe upon alternate days is popular at some foreign resorts, and to frail constitutions is often a judicious

distribution of the influences of treatment.

Occasionally, excessive bathing, especially at very high temperatures, and when accompanied by immoderate internal use of the waters, gives rise to a condition of general constitutional disturbance, with considerable fever, cardiac irritability, and a pustular eruption on the skin. This is known as *bad-strum* at the German spas, and *la poussée* at the French; and at some of the quack hydropathic establishments is termed "the crisis"—and pretended to be a necessary part of the cure. In reality, it is evidence of excessive and injudicious use of the waters, and consequent hyper-saturation, and is comparable to the "physiological," or semi-toxic, effects of drugs,

when administered too largely or too long. It seldom does much harm, and when the waters are entirely suspended passes off in a few days. At Saratoga these unpleasant symptoms appear much less frequently, and with less violence, than is common at foreign resorts. As moderate exercise is beneficial after the cold bath, so a period of complete repose is generally desirable after the warm.

THE DOUCHE.—Of the many special forms of bath those most worthy of consideration, irrespective of the nature of the water, are the *douche*, or movable jet bath, and the *wet pack*.

The Douche may be of any temperature, and is usually applied with considerable force—sometimes equal to that of water falling from 60 to 100

feet. By it, whether with hot or cold water, there is obtained, in addition to the ordinary effects of other baths, dependent mainly upon the nature and temperature of the water, a special mechanical quality in the impingement of the water against the skin, acting as a kind of *hydrodynamic massage*; and, thus stimulating in a favorable manner the peripheral nerves, blood vessels, and subjacent muscles. It is valuable in many conditions of constitutional debility, functional impotence, and chronic disease; more particularly, in abnormal states of the nervous system. In these cases, however, it is open to the objection that it can only be properly applied by a skilled attendant, and might prove dangerous in inexperienced hands. It

may be used colder than other forms of bath, owing to the force with which the water strikes the skin, but should always be of short duration. In France, where it is preferred to any other method of balneotherapy, and is extensively prescribed by Charcot, Dujardin-Beaumetz, and other noted authorities, it is usually administered by a physician under their direction. At the establishment of Keller, the patient of either sex stands before the operator, receiving the column of water alternately, or as circumstances dictate, upon the spine, and anterior surface of the body—a procedure somewhat startling to the Anglo-American sense of propriety, and scarcely in accord with our notions of professional dignity.

What is termed the Scotch, or mixed

douche—consisting of very hot and very cold jets, repeatedly alternated—is an excellent remedy for stiff joints, strumous or rheumatic exudations, and other local maladies.

THE WET PACK.—From a strictly therapeutic standpoint the *wet pack* is more widely applicable, and in some respects more valuable, than any other form of bath. Its administration needs no special skill, and with a little care is entirely free from danger. It can be taken in one's own apartment, and when mineralized water is used a quart bottle will suffice for a bath.

The method of applying it is as follows: A couple of stout blankets are spread upon the bed, then an ordinary linen sheet or tablecloth, which has been wrung out of water at a moderate tem-

perature—say 60° F.—is smoothly spread over them. The patient now lies in the center. The sheet is rapidly wrapped around him, one side being carried under the arms and well between the legs, while the other is brought outside the arms, and tucked closely about the neck, thus enclosing the entire body, except the head and feet, and so, that everywhere the wet sheet is in contact with the skin. The blankets are then rolled snugly about the body, and if desired, more covering may be heaped on top. A hot water bag to the feet, which are best excluded from the wet sheet, and, if found pleasant, a cool compress around the head complete the equipment. The first sensation is of chill, but this, almost invariably, passes off in a very few

seconds—otherwise the pack must be discontinued—then the sheet feels comfortably warm, the skin perspires freely, and there is experienced a singularly tranquilizing, calmative effect—easily leading to sleep.

Thus is obtained the benefit of a slight tonic reaction—so slight, as to make no appreciable demand upon the vitality—with superadded, a quieting, soothing effect, quite equal to that of the ordinary warm bath.

The patient may remain in the pack from twenty minutes to two hours, or even longer, dependent upon the result desired, and the degree of comfort induced ; and if disposed to sleep, he may be allowed to do so without detriment. The procedure is terminated by a rapid sponge over with tepid or

cold water, in order to counteract undue relaxation of the cutaneous structures ; or, if the patient is weary, a simple drying with a soft towel will suffice ; when he will soon fall into calm and refreshing sleep.

The merits of the wet pack deserve a wider recognition in the medical profession than accorded them, at present ; and it is much to be desired that the prejudice against such procedures—the popular hydrophobia which so hampers their employment in ordinary practice—should be thoroughly uprooted from the public mind. Thus, might be avoided many a dose of harmful medicine—thus, many a fevered skin cooled, many an irritable spirit calmed, and many a restless night spared,

From what has been said of its effects, it would seem unnecessary to specify the host of various maladies in which the wet pack, or some of its modifications, are valuable. From the earlier stages of pneumonia, simple pyrexia, and the exanthemata, to chronic rheumatism, phthisis, pelvic inflammations, dysmenorrhea, and insomnia, it is almost everywhere suitable, can scarcely do harm, and is capable of immeasurable good.

What is termed "the hot wet pack" is an entirely different form of treatment, with a much narrower applicability. In it is used, instead of a sheet wet with cold water, a blanket wrung out of very hot water; otherwise, the procedure is the same, although the effect is comparable rather to a *hot*

than a *warm* bath. It may be applied locally or to the entire body, in which latter case, it acts as a kind of universal stupe or poultice.

The "dripping sheet," and "sheet bath" differ slightly in technique, and have each warm advocates among scientific hydriatists ; but neither has appeared attractive to the writer.

Mud baths, except for dirt-lovers, and sand baths, except for hydrophobics, possess no merits not fully equaled by clean water.

TURKISH AND RUSSIAN BATHS.—An adequate consideration of the vapor and hot air, or Russian and Turkish baths, would demand a chapter to itself ; but is clearly beyond the scope of this work. Suffice it to say, that both forms of bath are luxurious to the high-

est degree; and to constitutions which they suit, and when properly carried out, are often beneficial and refreshing. In a general way they follow the principles governing other forms of bath; and are curative in much the same range of chronic disease. In the Turkish or dry air bath, a temperature up to 240° F. is easily borne for some minutes; while, in the Russian or vapor bath, 120° F. is barely endurable.

Although closely resembling each other in many respects, one fundamental difference must be remembered, that, while the Turkish bath favors perspiration more fully than any other hydriatic method, the Russian bath actually impedes it. Both increase to a very marked degree the excretion of urea, an effect, which, according to

German observers, continues for days after the bath.

Like other applications of extreme heat, they put considerable strain upon the vital functions, and are at times disturbing to nervous equilibrium. Cardiac action is not unfrequently even doubled in rapidity during the first ten or fifteen minutes, and the bodily temperature raised two or more degrees in the same time—conditions usually expressive of some morbid process.

Aside from their superlative cleanliness, the greatest merit of both forms of bath lies in the fact that the extreme heat prepares so perfectly for the delicious cold douching to follow; and hence, the subsequent feeling of invigoration. Nevertheless, they have but a limited applicability, either as a hy-

gienic measure, or in the treatment of disease. They should not be indulged in by the old, or when there is any suspicion of organic disease, or indeed, under any circumstances without competent advice.

There are three bathing establishments at Saratoga: *The Saratoga Baths*, just opened and luxuriously appointed; *The Red Spring*, and the misnamed *Magnetic*. There is also a bath house at *The White Sulphur Spring*, south of Saratoga Lake. All are well conducted.

CHAPTER VIII.

THERAPEUTIC APPLICABILITY, AND DIETETICS.

THE omni-curative pretension, which so often characterizes the literature of mineral waters, is apt to suggest a doubt of their remedial potency, even within the domain where their value has been demonstrated beyond question. And, unfortunately, this tendency to exaggeration is not confined to the advertising circulars, but sometimes may be noticed in the writings of those from whom better things might be expected.

To cite an example, not too near home, a Carlsbad physician—of homeo-

pathic persuasion — works his way through the nosological alphabet, enumerating as curable by that spa almost every conceivable malady: no less than eight distinct diseases of the spleen; “most of which,” comments Dr. Madden, with delicious cynicism, “we are utterly ignorant of in this country, but have the satisfaction of learning that they may all be cured by sending the patient to Carlsbad.”

Strange as it may seem, such stupid hyperbole is not always intentionally dishonest, but often the result of the common error, which is responsible for much of the confusion and contradiction pertaining to the subject; and which, it has been one of the first objects of this work to correct. *Mineral waters are in no sense specifics.* Judi-

ciously selected, and carefully administered, *they are, without exception, the safest and most efficient correctives of the morbid constitutional conditions common to most forms of chronic disease*; and hence, may be justly credited with the widest range of *indirect* curative power; but, even in conditions, such as the uric acid diathesis, in which their action is most chemically direct, it is based upon the same scientific principles which govern the use of other remedies; and, should be guarded by the same discrimination and watchfulness, that we are accustomed to exercise in other methods of practice.

The dogmatic assertion that one spring will cure rheumatism, another gout, another kidney diseases, and another dyspepsia—without any regard

to the type of the disease or the condition of the patient—is as unjust to the water, as it is cruelly misleading to the sufferer; and too often results in disappointment to the one, and unmerited loss of reputation by the other. It even happens that the same water, which is most capable of combating a morbid predisposition, or *actually engaged* in erradicating a dyscrasia, may, if unwisely pressed, absolutely aggravate the active manifestations. Thus, for instance, it has been noticed, and unfairly cited in disparagement of mineral hydratics, that the alkaline waters most warmly commended for the relief of constitutional gout, will, in some cases, positively determine an acute attack. Such misfortunes, however, are readily intelligible to anyone who will

take the trouble of understanding the *rationalé* of mineral-water drinking, in conjunction with the pathology of this, or any other disease ; and, are as easily avoided as the untoward consequences, following the misuse of any other remedy.

No less easily understood is the apparently paradoxical experience, that diseases of quite different kind are cured or alleviated at the same spa, whereas cases of the same nature are cured or alleviated by very different spas ; merely showing, that any well directed course of mineral waters, independent of its immediate effects, has, by its influence upon metabolism, a health-restoring quality in almost every perverted condition of the system.

When we remember, the variety and

therapeutic powers of the Saratoga waters; the absence of all guidance or restriction in their use; the diverse conditions in which they are prescribed, often entirely at haphazard, without reference to the quality of their ingredients, the method of their action, or the fitness of any particular spring to the special need of the individual patient; and finally, with entire neglect of the general hygienic precautions which usually surround any other medicinal course—it is indeed remarkable how regularly they produce beneficial effects, and how seldom we hear of an authenticated failure, after even the semblance of a fair trial. When disappointment does result, it is unhesitatingly attributed to the worthlessness, or uncertain action, of the waters, and not,

as it usually should be, to the unwise selection of a spring, or, perhaps, the ill-advised administration of an entirely inappropriate remedy.

DIET.—A properly regulated dietary is the most important auxiliary of an hydriatic course. Indeed, it is absolutely essential to a satisfactory result ; but here, too, it is necessary to clear the decks of absurd exaggeration, and traditional prejudice, as preliminary to a reasonable mastery of the situation.

A large proportion of all disease is attributable directly or remotely to an habitually injudicious diet. This is especially true of gout, rheumatism, dyspepsia, hepatic and renal complaints, and a variety of other ailments most susceptible of relief at Saratoga, and most likely to seek treatment

there. It is the fundamental principle of rational medicine to remove, or mitigate, the cause of disease before essaying its cure. In the ordinary routine of practice, we are accustomed to advise such patients as to their habits of life, and specify for them an approximate scale of diet—the adoption of which we regard as no less significant than the medicine prescribed for the disease. Dietetic reformation, to precisely the same extent, neither more or less, is necessary during a hydro-mineral course as during any other course of regular medication; bearing in mind, of course, the special chemical characteristics of the water, and the conditions incidental to the bulk of fluid consumed.

Persons suffering from complaints di-

rectly the result of over-eating, or other excess, who unfortunately lack the requisite self-control to abstain from continued intemperance, may, *for this reason*, derive more benefit at Carlsbad—where there is little temptation to gastronomic over-indulgence—than at Saratoga, where every prandial delicacy is easily procurable. But let it be clearly understood that, in these doubly deplorable cases, any temporary betterment achieved abroad is in no way due to superiority of the Carlsbad waters over those of Saratoga, but entirely to the enforced restrictions at the Bohemian resort; whereas at Saratoga one may gormandize and get drunk, or live as a rational being, whichever he pleases.

The writer admits a lack of sym-

pathy with the view sometimes expressed by physicians, that the ordinary routine of life should be restricted at every turn for the protection of those, so wanting in moral sway, as to be unable to enjoy its good things, without pernicious excess. One so unfortunately constituted that he cannot sit to a liberal table without gluttony, or meet his friends without intemperance, is sincerely to be pitied; and needs precisely the same special guardianship against the temptations of fashionable Saratoga that he does against those of New York City, or any other civilized center; and, it may be added, has just as little claim to have others inconvenienced because of his vices. But surely, the majority of invalids may be trusted to restrict

themselves, in these respects, within the limits dictated by common sense, or prescribed by their physician ; and will select from the most elaborate *menu* the articles allowable in their condition, to the exclusion of those which everybody knows to be indigestible.

As a matter of fact, the restrictions of diet especially demanded by a course of Saratoga waters, independent of limitations indicated by the nature of the disease, are fully expressed in the single monition : *Moderation in all things*. It should be remembered, however, particularly during the first days after arrival, that the appropriate use of the waters, together with the fresh country air, the change of surroundings, and even the altered hours

of meals, are liable to sharpen the appetite to an unwonted degree ; and hence there is a tendency to eat too much—especially of the delicious fresh vegetables so plentiful at this season.

The absolute prohibition, during any hydro-mineral course, of certain otherwise unobjectionable articles of diet, such as butter, fats, vegetables, acid fruits and wines, on the ground of a special incompatibility with the water, still pertains to a great extent at Carlsbad and elsewhere—as a part of the mysterious dogmatism so impressive to the half-educated valetudinarian. It is, however, based upon physiological error, long since exploded ; and is unworthy of consideration, beyond the reasonable discrimination which one seeking relief from disordered diges-

tion, or its consequences, should exercise in the selection and combination of foods. It is asserted that a water containing alkaline salts prematurely saponifies butter and fats ; but as such a water should never be taken so closely before a meal as not to allow of its absorption into the blood, or neutralization by the acid juices of the stomach—or, soon after food, unless there is evidence of gastric hyperacidity—it is impossible to suppose that any such a process can take place to an objectionable degree ; and, although, no well-chosen dietary admits of excessively fat, or greasily cooked foods, and such are especially interdicted in hepatic and dyspeptic infirmities, yet a reasonable amount of fat aids in nutrition, and even promotes stomachic

digestion ; and this, can be taken in no better, or more easily assimilated, form than as good butter.

Acid fruits and wines are apt to disagree under all circumstances, notably with persons of weak digestion or rheumatic tendency ; but otherwise, it is incongruous with the most elementary knowledge of physiological chemistry, to declare that, taken in moderation, they could nullify the constitutional benefits of an alkaline course ; for, in their passage through the system, the alkaline bicarbonates must encounter much more powerful acids than these : nevertheless we know that they reappear as carbonates in the blood and secretions.

Pretty much the same general considerations govern the admission, or

complete interdiction of alcohol, in other forms. The oft-repeated cocktail—everywhere injurious—does not become salubrious at Saratoga; neither can it be honestly stated that it acquires a more rapidly fatal influence, because the tippler has commenced the day well, with a few glasses of sparkling mineral water.

It would be clearly out of place here to enter upon a general discussion of the dietetic uses of wine or alcohol. It is well understood that excessive indulgence in either is a prolific cause of gout, rheumatism, dyspepsia, and other conditions most benefited by a course of mineral water; and therefore, it should be unnecessary to urge upon those seeking relief from these ailments, the advisability of a much re-

stricted indulgence, or total abstinence—at least during the continuance of treatment. It may be added, that in spite of the prevailing conviviality, and absolute freedom from restraint of any kind, the general conditions of residence at Saratoga are extremely favorable for the *self-reformation* of the habitually immoderate drinker ; for, not only is there less craving for bracers, owing to the invigorating influence of the clear atmosphere, the bright surroundings, and the stimulating effect of the waters ; but, it is always easier to give up pernicious customs when led away from familiar evil associations ; and it need not be said that amended habits, so acquired—*without forfeiture of self-respect*—are more likely to endure, than any resulting

from temporary enforced restrictions, or Keeley quackery.

One of the shrewdest of ancient philosophers declares that "a well-governed stomach is a great part of liberty."* Teach widely, then, in this land of liberty, the difference between what is right and what is wrong : impress upon human intelligence the immutability of cause and effect ; but, in essentially personal matters, let every free man be a law unto himself. Even, if desired, it would be scientifically impossible to formulate a dietary suitable for everyone using the waters. This, as the regulation of exercise, hours of rising and retiring, and other hygienic routine, must be determined individually ;

* "Magna pars libertatis est bene moratus venter."—*Seneca Epist.*, 123.

not only with reference to the special ailment of the invalid, and his general physical condition, but as bearing upon his previous habits and mode of life.

CHAPTER IX.

A PRACTICAL DIVISION OF SARATOGA WATERS.

IN the number and excellence of the Saratoga springs we have indeed such an embarrassment of riches, that to individualize their therapeutic merits is scarcely possible, beyond a reference to the tables comparing their mineral contents. A preference may be given, everything else being equal, to springs presenting a more recent, and consequently reliable analysis ; and to those having a deep and modern tubing, which assures a greater protection against surface contamination.

It is merely for convenience, in discussing their remedial applicability, that those deemed of most importance are roughly classified as follows :

1. *Powerfully Saline* : The *Champion* and *Carlsbad* : in which the preponderance of salines practically overshadows the other ingredients, however abundant and helpful. Usual effects : actively cathartic, diuretic, and deobstruent.

2. *Powerful Saline-Alkaline* : Notably the *Geyser* : a pleasant and valuable water, containing a large proportion of the bicarbonates of sodium and lithium. Effects, same as previous, but in small quantities more distinctly anti-lithæmic and alterative.

3. *Medium Alkaline-Saline* : The

Congress and *Hathorn*: both of which have acquired a world-wide, and well-deserved reputation; and both have been recently retubed in the latest approved manner. Effects: briskly aperient, when taken fasting in sufficient quantity; also, diuretic, diaphoretic, alterative, anti-scorbutic, stimulant, and, under some circumstances, sedative. The *Excelsior* may also be included in this class.

4. *Mild Alkaline-Saline*: The *Patterson*, *Peerless*, and *Royal*. All recently discovered deep wells, perfectly tubed, exceedingly valuable and palatable; and, possessing in a milder, but amply serviceable degree, all the virtues credited to the stronger waters. The *Patterson* is a perfect mineral water.

5. *Notably Alkaline*: The *Kissingen*, and *Vichy*. In both the bicarbonate of sodium largely predominates ; but, with sufficient saline adjuvant to form a delicious and in every respect excellent alkaline water—fully adequate to meet all indications of the acid dyscrasiæ, yet practically incapable of harm, with reasonable regard to the cautions already specified. Under ordinary circumstances they are but slightly laxative.

6. *Chalybeate*: The *Columbian*, *Hamilton*, *Washington*, and *Pavilion*. Their tonic and blood-making qualities have been fully stated in a previous chapter, when discussing the importance of iron as an ingredient of mineral water. All require a re-analysis, and more modern tubing.

7. *Sulphated*: The *White Sulphur Spring*, situated about one mile to the northeast, near the Eureka Spring, is a good water, especially for bathing; but has been entirely neglected of late years; the other *White Sulphur Spring*, at the southern end of Saratoga Lake, possesses the usual qualities of a mild sulphur water—aperient deobstruent.

Besides these, should be mentioned the *High Rock* and the *Red Spring*, each with over a century's commendation, and still retaining a deserved popularity; the *Star*, which is widely known, especially through the Eastern States, and has contributed its quota to the universal fame of the Saratoga springs; and also, the *Favorite*, *Empire*, *Saratoga A*, *Seltzer*, and *Union*.

The *Eureka*, *Imperial*, and *Crystal* are no longer cared for; and over a dozen others have been named, but never analyzed or developed.

CHAPTER X.

GENERAL PRECEPTS.

IT is clearly impossible to lay down general rules governing the various and complicated questions involved in an hydriatic course, which would apply to even a single class of cases, without innumerable exceptions. The particular spring or springs to be patronized, the quantity of water to be consumed, the best time and method of taking it, the proper duration of treatment, and the wisdom of combining baths with the internal use of the waters—must all be determined for each individual patient, in accordance with the rational principles already enunciated, and sub-

ject to modification conformable with the early results.

It was the advice of the older Saratoga physicians,* is customary at most European Spas, and, as a general precept, can scarcely be improved : to visit the springs while still fasting in the morning, take two, three, or more glasses of water—as may prove necessary for catharsis—with a promenade of ten or fifteen minutes between each glass, and, after the last one, at least an hour's occasional gentle exercise before breakfast. Then, if further imbibition is considered desirable, the patient should return to the spring about one hour before the afternoon or evening meals, or both ; but at these times a smaller quantity is always sufficient.

* Steele, North, and Allen.

Although, in the great majority of cases, and for reasons some of which will be referred to in a subsequent chapter, it is preferable to drink the waters as flowing fresh and sparkling from the fountains, yet, for some delicate persons, it may be on the whole more advantageous—and for those who rise late, and habitually occupy much time over their toilets, more convenient—to have the first water brought to their rooms, and drink it leisurely while dressing. The early morning, and an empty stomach, are pre-eminently the favorable time and condition for mineral water drinking; more especially, for that intended to act perceptibly upon the bowels and secretions. This is so, not only because the gastric and intestinal vessels are more ready to

absorb after the night's rest, and prolonged deprivation of fluid; but also because, under these circumstances especially, a draught of cold water of any character, will reflexly stimulate peristaltic movements, and thus promote the emptying of the lower bowel. But even this rule is open to exception. Invalids of the same frail constitution, which wisely debarred from the more severe routine of early rising and anteprandial exercise, will, occasionally, derive more benefit by postponing the use of the water until an hour or so after a cup of hot coffee, or perhaps a light breakfast.

Under ordinary conditions the Saratoga waters should be taken at their natural temperature: about 50° F. This rule, also, particularly applies to

the morning draught, and when catharsis is the principal purpose. Thus imbibed, they promote purgation by three distinct, but co-operative methods. As just stated, the unaccustomed stimulus of cold to the stomach *reflexly* augments peristaltic action ; and, moreover, it retards the stomachic absorption of the salts, which are consequently carried on into the intestines, there *chemically* augmenting secretion ; and finally, by *direct irritation*, they still further increase peristaltic movement. On the other hand, when warmed to about the temperature of the blood, the water is more easily absorbed, and in some instances less apt to disagree with a very sensitive stomach. It may be heated to any desired degree, either by the direct addition of very hot

water, or by placing in hot water the uncorked bottle. This process involves the escape of some carbonic acid gas, but, as already noted in speaking of warm baths, the Saratoga waters are so rich in this commodity, that they can well afford a considerable loss, and still retain sufficient for all purposes; and more than the most celebrated thermal waters abroad.

The quantity of mineral water necessary for the best results, can only be determined with reference to the constitutional peculiarities of the individual, the nature of the ailment, and the particular spring used. There is a decided tendency to drink too much, among those who are very much in earnest in the search for health; and also, among another class—by no

means insignificant—who are determined to get full value for the expenditure entailed in visiting the springs. It is difficult to convince these people that the measure of benefit, to be derived from the waters, is in no sense proportionate to the quantity consumed, but rather to the discretion and regularity with which it is used. From one, to four pints a day, is sufficient for almost any indication. To deluge the stomach with inordinate quantities, of even the milder waters, can only result in disordered digestion, catarrh of the stomach and intestines, diarrhea, renal irritability, and other constitutional disturbances—which will more than nullify any otherwise happy effects.

As set forth in an earlier chapter, purgation and diuresis—although ex-

ceedingly gratifying to the ignorant invalid, and in almost every case really serviceable—are by no means the most valuable remedial effects of the Saratoga waters. At the same time, it is important, especially during the first days of any hydro-mineral course, that the bowels should act quite freely ; otherwise vascular excitation, headache, and other unpleasant symptoms may ensue. But if a reasonable use of the waters should fail to induce a moderately laxative effect, it will be better to re-enforce their action by some mild pharmaceutical aperient, than to inordinately increase the quantity consumed.

The appearance of diarrhea, or other evidence of intestinal irritation, usually indicates that the water is *not sufficiently absorbed* in the stomach,

and upper alimentary tract. This may sometimes be corrected, even without reducing the quantity of water, by heating, or by dividing it into smaller doses. Constipation, on the other hand, points to *too rapid absorption* ; but, although not uncommon at other spas, seldom arises at Saratoga, owing to the happy combination of salines in both the chalybeate and alkaline waters.

Mixing different waters is generally observed to disagree ; but there is no reason why one should be restricted to any particular spring, for even a single day ; and where there are so many to choose from of similar therapeutic qualities, yet slightly differing in taste, the palate of the patient should be consulted when possible. It is commonly a good plan to drink the Hathorn, Con-

gress, or Excelsior during the morning hours ; and later in the day, after the bowels have acted freely, to partake of one of the milder alkaline-saline, chalybeate, or notable alkaline waters, as indicated by the nature of the disease.

It sometimes suits best to use the same water throughout an entire course ; and if well chosen in the beginning, there is seldom need to change. Indeed, it is not difficult to find among the habitués of Saratoga, those, who pretend to know all about it, yet swear by one spring, and will not hear of any other.

But a single general question remains, and even that cannot be answered without reservations : How far is it wise to abandon a regular medical

treatment during a course of Saratoga waters? When, as is the rule in chronic complaints, the previous remedies have been themselves of the alterative character—such as the iodides, bromides, or chlorides of mercury, sodium, potassium, or arsenic—it is usually better to entirely suspend their use during the hydiatic course; not so much, because of any incompatibility with the waters, as in order to test their marvelous powers unaided; to avoid the common error of over-drugging, or confusion in observing effects; and to reserve our faithful friends of the pharmacopœia for emergencies, in which it might be impossible to satisfactorily administer the waters. On the other hand, when the symptoms are urgent, there is no reason why these

drugs, or others of a different nature—such as colchicum, salicin, digitalis, quinine, aconite, opium, belladonna, or pepsine—should not be combined with a moderate use of the waters.

There can be no dogmatic limit to the judicious use of waters, the main ingredients of which have been shown to be necessary components of the normal body—so long as they agree with the person using them. Nevertheless, the summer months are decidedly the best time for any regular course of mineral waters; for, independent of the special advantages of visiting the springs, and drinking the waters fresh at their source, and the co-operative healthful accompaniments of such a trip—which might often claim considerable share of credit for good results obtained—

the warm weather especially favors augmented transudation of the skin and membranes—an important element in the hydriatic influence.

CHAPTER XI.

NOSOLOGY.

THE method heretofore pursued has been to explain the *special qualities* of mineral waters, together with the *physiological principles* governing their therapeutic action. If the object intended has, so far, been successfully attained, the essential outlines of the subject—the general applicability of hydriatic treatment, as well as, the conditions which contra-indicate its use—are already understood by the intelligent reader; and it is scarcely necessary to particularize, in detail, the modifications of procedure suitable for each form of disease; or to emphasize a system

scientifically correct, by tedious narration of individual cases.

It only remains, therefore, to consider briefly the more important morbid states, with special reference to this mode of treatment.

SCROFULA AND TUBERCULOSIS.—Scrofula is a scourge which afflicts all classes of society. Yet, in practice we scarcely speak the word, for it savors of reproach, although often without reason. The true physician, however, is equally thoughtful to spare mental pain, as to relieve bodily suffering. Fortunately, in the whole category of disease, there is not one in which happy results may be more confidently expected, from a judicious use of mineral waters.

The scrofulous diathesis is a morbid constitutional state, commonly inher-

ited, but invariably associated with torpidity of the lymphatic system, and perversion of nutritive activity. It usually declares itself in early life, and strange to say, almost equally in persons of totally different appearance and temperament. Its baneful influence may predominate, alike, in those of slender physique, fine transparent skin, blue eyes, blond complexion, and tapering hands; as in an opposite and less attractive class, distinguishable by short, ungainly stature, dark coarse skin, stubby features, and clubbed fingers. Its pathological manifestations are no less inclusive—ranging from mucous catarrhs, with a tendency to the development of pulmonary phthisis, to degeneration of lymphatic glands, indolent swellings, exudations in cellular tissue,

cold abscess, skin diseases, necrosis of bone, and disorganization of joints. One and all are primarily an expression of impairment of the complex association of functions, already frequently referred to as *metabolism*. Defective performance of this composite process, and consequent mal-nutrition of the tissues, invariably distinguishes the scrofulous dyscrasia ; and, therefore, whatever the special form it may have assumed, it would be irrational to essay the cure of local expressions, without also striking deep at the root of the evil—the perverted constitutional habit.

To those who have studied the previous pages, it will be easily apparent, on theoretical grounds, how perfect a remedy is offered for this lamentable condition by a sojourn at Saratoga,

and a systematic course of mineral hydrotherapy.♥ It has been demonstrated that both drinking and bathing in the saline water promote and improve metabolism, *which is here at fault*—the baths dealing, mainly, with the changes of non-azotized, and imbibation with those of azotized substances. Hence by a judicious combination of both methods, we may promote a healthy tissue-change in every direction—precisely what is needed to combat the scrofulous tendency.

But, more convincing than theory is the universal experience that these patients, even when by no means skillfully handled, almost always improve, and frequently attain a positive cure at Saratoga; and, allowing the fullest credit to change of air, diet, and other

contributory hygienic influences—which it will be noticed do not, *unaided*, produce such cures elsewhere—there can be no doubt that the mineral water is the main factor in attaining a salutary result.

There is still another consideration : During the summer months the ordinary therapeutic treatment of scrofula is usually, and for good reasons, either entirely suspended or materially modified. The cod-liver oil, so valuable in winter, is especially apt to disagree during warm weather ; and experience suggests the wisdom of reserving the other trusted aids of pharmacy until the return of the more trying season. It is during this interval that the water treatment will be found especially valuable. The interruption, or diminution,

of accustomed medication gives nature an opportunity to profit by its past alterative influence, while skillful hydrotherapy arouses her to the utilization of her own inherent forces.

The determination of hydropathic routine, for scrofulous patients, must depend upon the special phase and development of the malady, and the age, constitutional peculiarities, and vital possibilities of the individual.

For internal administration, the Saratoga waters are in every respect unequaled. The abundance of gas, the salines in almost any proportion desired, the iron in easily assimilated form, and the iodine and bromine in minute, but usually serviceable quantities—each separately answers some specific indication; and together, they

offer a compound remedy without any exception the most perfect in the world. The choice of springs, and the quantity of water to be prescribed, must be guided by the general principles inculcated in former chapters. As a rule, it is not well to purge these patients, particularly when, as is common in the lymphatic temperament, emaciation and anæmia are prominent features. The Hathorn, Congress, and Excelsior are usually suitable for the morning potation; the Patterson, High Rock, or Peerless, at almost any time during the day; and the Columbian in small doses, and regularly taken, soon after meals. These waters are particularly valuable in the treatment of scrofulous children, and are, as a rule, easily digested. For this period

of life it is sometimes well to shake the water, or let it stand ten or fifteen minutes, so as to promote a moderate escape of carbonic acid gas. In some forms of gastric disturbance, however, it will be found exceedingly valuable.

Mineral baths, of some sort, are strongly indicated in all forms of scrofula. Cold sea bathing has, from early times, been deemed a specific, and would be almost universally applicable, but for the danger of exposure to cold air, and the temptation to over-prolong the indulgence. The stronger Saratoga waters have a similar mineralization to sea water, but with the valuable addition of gaseous saturation—the stimulating influence of which upon the skin is exceedingly serviceable in these cases. And further, the con-

venient, and luxuriously appointed bath-houses render possible the scientific administration of this treatment, even to quite young children; and, under conditions—such as ocular, auricular, or cutaneous disorders of strumous origin, or intercurrent cardiac or nervous symptoms—which would absolutely preclude ocean bathing.

The form, temperature, and duration of the baths, and the frequency with which they should be administered, will depend upon circumstances already considered, and may possibly be modified, more than once, during the course of treatment, in accordance with the effects produced. The shower, spray, or rapid sponge bath—commencing at a temperature of about 75° F., and reducing 5° each day until

55° F. has been reached—will usually give the best results to begin with. As a rule, it is wise to go slow, in the blond, slender type of patient especially, and it is prudent to reserve the more severe, and consequently more efficacious, balneological procedures, until it has been noted how the milder ones are borne; and some estimate has been formed of the reactive capacity.

On the other hand, it should be remembered that the *rationalé* of cold bathing is to stimulate, and produce a vigorous reaction, and, therefore, the sooner, consistently with discretion, that a moderately cold water is reached, the quicker and more gratifying will be the result. It is remarkable, too, how well, even extremely low temperatures, are tolerated by scrofulous patients,

provided that the bath is properly conducted, and suitable friction rapidly applied. For these reasons, unless contraindicated by some special circumstance, cold baths are distinctly preferable to warm. It is a good programme, for the fairly robust scrofulous patient, suffering from indolent swellings of glands or joints, to take a cold shower, or full bath in the morning ; and, once or twice subsequently during the day, have the mixed, or Scottish douche applied to the affected part ; which treatment should usually be combined with a judicious internal use of the waters.

Scrofulous patients require a liberal, but carefully selected, diet.

Phthisis.—Pulmonary consumption is closely related to scrofula. Although, by no means all scrofulous persons de-

velop phthisis, and but a limited proportion of phthisical persons were primarily of the scrofulous diathesis, it is, nevertheless, in that unfortunate constitutional state that the tubercular germ finds most fertile soil.

From the purely hygienic standpoint, the consumptive can select no more ideal spot, in which to spend the summer, than Saratoga. But, in considering the propriety of mineral water treatment, we must confine ourselves distinctly to prophylaxis against tubercular invasion; and resistance to the initial onslaught of pulmonary phthisis, occurring in persons of scrofulous antecedents, and characterized by the slow asthenic progress, indicative of the strumous temperament.

The tubercular bacillus is a mean

and treacherous enemy—mainly to be dreaded when constitutional vitality has been depressed by inherited predisposition, or some extraneous cause. The whole world of scientific medicine is engaged to-day in the search for some direct weapon with which to smite this accursed microscopic foe; and happy will be the day when it is found, and blessed be the man who finds it. Meantime, we can only hope that, by stimulating the *vis medicatrix naturæ*, the recuperative power inherent to every healthy organism, we may starve by plenty, and thus annihilate, the wretched microbe which prospers on the want of its victim. The bacillus thrives in an ill-nourished tissue; and pulmonary consumption, more than any other disease of localized pathology, kills by

undermining the powers of life. Hence the ordinary systems of treatment, most approved, are directed rather to the constitutional debility, than to the lesion of the lung itself. We cannot directly cure consumption ; but, by perfect hygiene and judicious treatment, we may so enhance the vitality of the patient, as to arrest the progress of the earlier stage ; and sometimes even repair pulmonary mischief already accomplished.

From these considerations, may be reasonably inferred the possible utility of mineral waters. It has been explained that the hydriatic treatment is, of all things, *a stimulant to vital functions* ; but, it should be borne in mind, that its successful application pre-supposes a certain *latent* strength, which may be thus stirred into activity. In

the initial stage of tuberculosis, when such a stimulus is urgently called for, the skillful administration of the waters, both internally and externally, may be capable of untold benefit. But when the disease has progressed; when extensive breaking-down of lung tissue has already occurred; and the torpid constitutional habit is replaced by nervous irritability, vascular excitement, recurring pyrexia, and a tendency to hemorrhage; and, when there exists no longer, a reserve vitality to be drawn upon, then such treatment could do no possible good, and would only hasten an inevitably disastrous result. Under such circumstances, the highly gaseous waters are especially unsuitable.

But even, after the stage has been

reached when it would scarcely be deemed wise to prescribe the internal administration of mineral waters, unexpectedly happy results may still be achieved from a careful use of baths. A mineralized wet pack, followed, perhaps, by a cool rain bath or rapid sponge over, and taken each evening about the time when the rise of temperature usually occurs, is especially to be commended. Such a bath, or one at about 92° F., continued for fifteen or twenty minutes, in the ordinary bathtub, will be found exceedingly calmative to the excited nerve centers; and, a further good influence may be ascribed to its promoting vicarious perspiration—thus compensating for impaired expiration by the lungs. A mineralized and gaseous water is

usually preferable in the torpid temperament, in which cutaneous stimulation is mostly to be desired ; whereas, ordinary water is quite as effective, or even more so, for sedative purposes in highly nervous patients. It should also be remembered, that any considerable quantity of carbonic gas given off from the bath, and respired by the patient, would be especially injurious to the tuberculous lung.

Both in this country, and in England, a prejudice has always existed against the use of baths in consumption.

To the Germans we owe the knowledge that not only as prophylaxis, but even after the disease is already developed, and is capable of recognition by physical examination of the lungs, hydrotherapy “ plays an ex-

traordinarily important rôle.”* Any form of bath, and almost any temperature, seems to be admissible, and, in German hands, exempt from danger. Dr. Rohden, of Lippspring, says : “ The opinion that a warm bath, or any bath at all, may produce hemoptysis, I must, after thousands of experiments, declare to be thoroughly unfounded. On the contrary, many cases of obstinate spitting of blood have been checked by suitable lukewarm or warm baths, even when they had defied all other remedies.” Unfortunately, this happy experience is by no means universal. The writer himself, is aware of at least one case, in which the first hot bath, at a European spa, resulted in a copious and rapidly fatal hémor-

* Von Ziemssen.

rhage; and has no doubt that many such have occurred.

To recapitulate, a clear distinction must be recognized between cases showing a strong *predisposition* to phthisis, but, in which no structural alteration of the lung is yet discoverable; and those in which there already exists tubercular deposit, cavity, or tendency to hemoptysis. In the former class, careful internal use of the waters, and well regulated cold baths, are capable of *immeasurable benefit*; whereas, in the latter, imbibition is practically forbidden, and either extremes of temperature in the bath would be immediately dangerous; and, although frequent bathing is still desirable, to calm the excited nerve centers, control pyrexia, and maintain cutaneous activity, it

should be restricted to the tepid full bath, or wet pack. Winternitz, a high authority, favors a local wet pack, or cold compress applied to the chest alone.

Although applying rather to the winter resorts than to Saratoga—which is, in all respects, a desirable summer residence during any stage of pulmonary phthisis—the writer cannot leave this subject without recording a word of protest against the scandalous expedient of inducing a dying consumptive to leave the luxuries of a comfortable home, by the deceptive promise of benefit elsewhere. A physician's duty does not end with the possibility of recovery. However painful to his own feelings, and humiliating to his science, he is still bound to promote the com-

fort of his patient's last days—and then *euthanasia*.

GOUT AND RHEUMATISM.—Aside from hereditary predisposition, these maladies start with a common pathogenesis: primarily, defective digestion and faulty assimilation, with consequent disorder of the nutrient process; and, subsequently, an excess of acid material in the blood. Hence, their earliest therapeutic indication is also in common—to provide alkaline carbonates in order to neutralize abnormal acidity; but, from this point their courses so diverge, therapeutically, as well as pathologically, that it has even been proposed to confirm *a posteriori*, a distinctive diagnosis of the more prominent influence in the hybrid condition termed *rheumatic-gout*, by testing separately the remedial

power of their individual specifics—colchicum and salicin. The more chronic forms of gout and rheumatism, however, again resemble each other in many respects, notably in the benefit they derive from the use of the alkaline-saline waters ; but the details of procedure differ in so many important particulars as to require a separate, although brief consideration.

Gout.—As the outcome of heredity, or injudicious diet, or both, an excess of uric acid appears in the blood ; which, according to the best, but still obscure researches of biological chemistry, is, under certain conditions, liable to crystalize in the tissues ; and thus give rise to severe inflammation, pyrexia, swelling of joints, and intense pain—the simplest expressions of acute

gout. The treatment consists of local sedation, warmth, colchicum, and anti-phlogistics. Mineral waters, to the extent of effective medication, have at this stage no definite utility; and if unwisely administered, would probably aggravate the symptoms, by their generally stimulating influence.

In the intervals between those attacks, on the other hand, when it is intended to improve the constitutional condition, and correct the abnormal state of the blood which is liable at any moment to renew acute mischief, we have, in the alkaline-saline waters, a remedy of direct and invaluable potency.

The successful accomplishment of the requisite chemical changes in the blood, and the safe disposal of the re-

sulting products, are, however, by no means simple matters. When alkalies are brought into contact with uric acid, alkaline urates—of soda, lime, or lithia, as the case may be—are the result ; and these, if perfectly dissolved, and sufficiently diluted, and not in excess of the eliminative capacity of the excretory organs, are thrown off without trouble ; and the desired end is thus safely attained. When, however, a large quantity of alkaline salts are introduced into a system hypercharged with uric acid, and full provision for the solution and removal of the resulting urates is not at the same time assured, or when, by too rapid solution of deposits of uric acid—previously inactive in the tissues—an unwonted quantity is set free in the circulation,

an acute attack of gout is not unlikely to be the consequence.

This is the explanation * of those unfortunate crises, which occasionally occur during an apparently well directed course of alkaline waters; and which are responsible for the impression, not uncommon among podagric wise-acres that, "it is better to leave the gout severely alone." So it is, until one has learned to handle the remedy! But such attacks may be avoided, and yet, the constitutional condition corrected, by proceeding carefully with the earlier treatment, without unduly hastening the chemical changes; and further, by selecting waters, such as exist at Saratoga,

* Pfeiffer, *Die Gicht und ihre erfolgreiche Behandlung*; Fürst, *Deutsche med. Zeitung*, 1891.

which, by a suitable combination of alkalies and salines, not only accomplish the first indication of neutralizing excessive uric acid, but, in the same degree, provide for the dilution and elimination of the resulting urate compounds.

The bicarbonates—especially that of soda—as ordinarily administered, are particularly liable to determine these adventitious seizures. When long continued, they tend to disturb digestion, thus promoting an increased formation of the morbid material they were intended to eradicate; and, moreover, their use necessitates, in many cases, the constant employment of purgatives.

It has also been demonstrated ex-

perimentally * that, although under the influence of bicarbonate of soda, as usually prescribed, the uric acid in the urine diminishes at first, until it has almost entirely disappeared, yet, it soon returns again in spite of the continued administration of the medicine. On the other hand, not only does a much smaller quantity of the bicarbonate produce the same result, when contained, in combination, in a natural mineral water ; but the effect continues as long as the water is taken, and often outlasts the treatment by a considerable period.

An insuperable obstacle to summarizing a treatment of gout, lies in the

* Munch, *Archiv für heilkunde*; Braun, *op. cit.*; Frickhinger, *Über die harnsäure lösende Eigenschaft des Fachinger Wassers*; Fürst, *op. cit.*

frequency and variety of associated ailments : some causative, others consequential. Dyspepsia, enlargement of the liver, spleen or pancreas, inactivity of the kidneys, torpidity of the intestines, general organic stasis, or the condition described as abdominal plethora—are all, prominent contributing factors in the induction of gout. Fortunately, the same waters indicated for uncomplicated, or “regular gout,” are usually of a nature to be directly serviceable to each of these contributory conditions. Their presence and prominence will, however, materially influence the selection of a spring—favoring, as a rule, an increased proportion of saline ingredients. On the other hand, there are a number of minor ailments, such as skin diseases, catarrhs, and the like,

which are directly the products of constitutional gout; and, bearing upon them the stamp of the dyscrasia, are thus, independent of special characteristics, brought within the scope of mineral hydriatics.

It must not be understood that beneficial results attending a well directed course of the Saratoga, or similar waters, in the gouty diathesis, is to be exclusively attributed to the nature of the ingredients, and consequent chemical reaction taking place within the body. On the contrary, at least as much credit should be accorded to their influence in promoting metabolism, especially the oxidation of the carbohydrates, and formation of urea; and to the hydro-static lixiviation of the tissues and juices; and to the augmented

activity of the excretive organs, and consequent solution and washing out of effete matters in general—including, no doubt, the *materies morbi* of gout.

The prognosis in these cases should usually be guarded. The confirmed gouty constitution is under all circumstances unsatisfactory to manage. Recovery is necessarily a slow process; and in many of the old established cases it can scarcely be hoped to do more than improve the general constitution, ward off acute attacks, limit the deposit of urates, and, perhaps, after considerable perseverance, diminish exudations, or partially dissolve articular deposits. Charcot * questions the latter possibility of hydro-mineral treatment, but it may be noted that this distinguished

* Sur les maladies des Vieillards.

authority has had no experience with Saratoga waters.

In gout, more even than in other diseases, the details of hydropathic treatment must be modified in accordance with the requirements of the individual case. Generally speaking, the prolonged internal use of the waters is of more value than bathing; although moderately warm (95° to 105° F.) full baths, and wet packs, mitigate constitutional irritability, improve the condition of the skin, and in recent cases may even promote absorption. Local packing is usually soothing, but in the suppressed form may determine a more acute inflammation. Showers, sprays, and douches are contra-indicated; except as prophylaxis in robust persons of hereditary predisposition, but in

whom the disease is as yet undefined. Not uncommonly heart lesions, or other organic defects, will be found to exist in the more serious forms of gout, which of themselves would absolutely preclude the cold water treatment.

The choice of springs should be guided by the nature of the local manifestations, and the preponderance of constitutional plethora or anæmia. For the uncomplicated dyscrasia, notably alkaline waters, with comparatively slight saline admixture—such as the Kissengen and Vichy—may answer well. With abdominal torpidity, a greater proportion of chloride of sodium is indicated, and then the Patterson, Hathorn, Congress, or Excelsior may be recommended ; or, if plethoric engorgement is still more conspicuous,

the powerfully saline Carlsbad, Champion, or Geyser. In atonic cases, with well marked debility, often resulting from repeated attacks, or too prolonged depressing treatment, the saline-chalybeates may prove most beneficial.

In this disease all waters are better taken warm, the slight loss of gas entailed thereby, being, if anything, an advantage.

The bowels should be kept freely open; and for this, or any other purpose, we must not hesitate, when necessary, to combine pharmaceutical remedies with hydriatic procedures.

Rheumatism.—In this disease hydro-mineral treatment is accorded universal commendation. Indeed, it is astonishing that there are so few disappointments, when it is remem-

bered how recklessly are put forward the rival claims of mineral springs all the world over; how many, and how varied are the morbid expressions included under the almost generic term, *rheumatism*; and how innumerable are the sufferers, who, without direction of any kind, or the least knowledge of their chemical quality or method of action, partake of mineral waters—often totally unsuited for their particular cases.

But rheumatism is as erratic in its manifestations and retrocessions, as it is obscure in its causation and pathology; and hence, it being impossible to establish its treatment upon a strictly rational basis, we are in a large measure forced to accept the guidance of experience.

For convenience, it has been here associated with gout, but although resembling each other in so many particulars, it would be difficult to maintain a scientific connection between gout and rheumatism; and even the primary postulate of an acid dyscrasia, might be doubted in some unquestionably rheumatic affections, were it not for the regularity with which good results follow the appropriate use of alkaline remedies. As may be imagined, a full discussion of the hydro-therapeutics of rheumatism might fill a volume; and yet there remains but little to be said of really practical importance, which is not indirectly embodied in the abstract principles already enunciated.

As in gout, the applicability of hydriatic methods is directly proportion-

ate to the chronic character of the symptoms ; and would usually be negatived in the acute disorder. Possible exceptions to this rule, are the administration of cold baths during the extreme temperatures of rheumatic fever ; and, the limited use of the milder alkaline waters—from which most of the gas has been permitted to escape—as a febrifuge, in the same condition.

The sub-acute varieties of muscular and articular rheumatism are exceedingly liable to engraft themselves upon the other cachetic states, such as the malarial, scrofulous, or lithæmic ; and, are not uncommonly associated with specific or catarrhal taints. These circumstances distinctly favor the hydro-mineral treatment ; but, occasionally

suggest the combined administration of the pharmacopœial iodides, or similar medicaments—which are in no sense incompatible with it. Neither is there reason, why in suitable cases, electricity should entirely resign its important function. Mineral waters, however, possess no electrical or magnetic properties; and, therefore, it is to be regretted that baths well conducted, and otherwise to be highly recommended, should, in this respect, sail under false colors.

For internal use, the waters of Saratoga are unequalled in the treatment of rheumatism. The choice of springs is governed by the same principles applied to gout, and other diseases. In uncomplicated cases, the prominence of the alkaline bicarbonates, especially

those of lithia and soda, is the primary consideration. The relative importance of the salines and iron will depend upon constitutional characteristics already explained in other connections; while for corpulent persons, otherwise healthy, an active course of the stronger purgative waters may produce excellent results.

In about the same proportion as the *internal* use of mineral waters is of most importance in the treatment of gout, so is the *external application* for the cure of rheumatism. This seems largely due to their effect upon the skin. There is a peculiar torpidity of that organ, described as *atony of the skin*,* which seems to be both causative, and adjunctive, of sub-acute

* Braun—Herman Weber.

rheumarthritis; and which is most favorably influenced by all forms of stimulant bathing.

With few exceptions, the treatment of rheumatism may be advantageously conducted upon more vigorous lines than would be admissible, under similar circumstances, in the management of gout. In the absence of cardiac, or other organic sequelæ of the acute stages—the presence of which can usually be ascertained without difficulty—there is no reason why energetic balneological procedures should not be early invoked with immediate advantage.

The choice between heat and cold is subject to the considerations fully discussed in the chapter upon baths. Cold water treatment, when admissible,

is in every respect to be preferred; for by it, we not only cure the rheumatism; but likewise restore vigorous health, and not unfrequently metamorphose a limping valetudinarian into an example of robust physical well-being.

On the other hand, distinctly hot (105° F.) mineral baths—continued from twenty minutes to half an hour, and repeated once a day, or oftener, whether followed by a cool shower or not—have given most gratifying results, under circumstances precluding the application of cold. It is a general belief, that upon their high temperature and long duration, rather than upon the mineralization of the water, depends the world-wide reputation for curing rheumatism, enjoyed by many of the “in-

different" thermal baths, at European spas.*

Almost any modification of balneological procedure may be indicated in the treatment of this disease. Douches, or the douche-massage, at any temperature, are especially applicable when the larger articulations, such as knees, hips, or shoulders are prominently affected; and for long standing peri-articular exudations—the prognosis of which, it may be said, is decidedly more hopeful than in similar conditions of gouty origin. In recent sub-acute rheumatism of the muscles or joints, wet packs are particularly valuable; and the early use of the hot air, or vapor bath, has successfully aborted an attack.

* Teplitz, Wiesbaden, Wildbad, and others.

Of the vicarious local affections known as *lumbago*, *torticollis*, and *sciatica* — *intercostal*, *cervico-brachial*, *mammillary*, and *lumbo-abdominal neuralgias*, it may be premised, that just in the proportion as their causation is rheumatic or otherwise cachectic, *and not neurotic*, will they derive benefit from mineral baths, local douches, and the internal use of the Saratoga waters.

It should be remembered that, in the cure or palliation of any form of rheumatism, a restricted diet, and well-regulated hygiene, constitute essential factors.

DISEASES OF THE DIGESTIVE ORGANS.
—Hydro-mineral treatment, of some variety, is so constantly applicable to ailments of this class, that to consider

them separately, would involve a continued repetition.

Saratoga is famous for the cure of dyspeptics. Its waters contain elements suitable for almost every type of gastric derangement; and yet, to prescribe them with a reasonable certainty of success, necessitates the same accuracy of diagnosis, as would be indispensable in using the remedies of the pharmacopœia.

For the *atonic conditions* marked by peristaltic inertia, and deficient gastric secretion, which, in ordinary practice, would suggest the exhibition of nuxvomica, capsicum, armoracia, acids, or pepsine, the waters rich in chloride of sodium and carbonic acid are especially indicated; and should, as a rule, be taken before meals, and *cold*—so as to

retard stomachic absorption, and emphasise the locally stimulating effect. When, on the other hand, the symptoms are those of sub-acute gastritis, evidenced by hypersecretion, hyperacidity, local tenderness, sense of fullness, and flatulent irructations, the milder alkaline waters, in which soda, magnesia, and lime predominate, will give the best results. In these cases they may be taken during, or soon after meals, and are usually most effective when used *warm*, in small quantities and frequently. Magnesia is especially valuable as a stomachic antacid, and lime, when there is tendency to flatulence or diarrhea—lithia and soda in almost all circumstances.

In many ordinary forms of gastric indigestion, evincing generally defective

function, and often partaking of the distinctive characteristics of both the aforementioned classes, the combination of chlorides and bicarbonates, found in the milder alkaline-saline waters, may prove singularly effective. When catarrhal hyper-secretion is coincident with gastric dilatation, the waters may be used advantageously to wash out the stomach with the syphon tube; after which operation, at least twenty minutes should elapse before food.

Hydro-mineral treatment may be regarded as prophylactic against gastric ulcer, which, no doubt, often results from long-continued hyper-acidity; but when the existence of ulcer has been positively recognized, it is wise to interdict the stronger saline and gaseous waters, as being too irritating to the

diseased surface, and possibly tending toward hæmatemesis. The mild alkaline waters, however, heated and partially deprived of gas, may still be beneficial.

It should be remembered that, besides their immediate chemical action upon hyper-acid secretion, and the hydro-dynamic cleansing of unhealthy gastric membranes, these bicarbonate-saline waters render a further service by increasing the anti-catarrhal influence of alkalies in the circulation, and improving the general health. In promoting the latter intent, with special reference to the betterment of digestion, the favorable influence of cold baths, showers, douches, and all forms of mineral bathing is indubitable.

Liver.—"Is life worth living?" in-

quires the title of Mallock's interesting book. "It all depends upon the liver," is the well-known response of the witty sybarite. Then Saratoga, beyond a doubt, contributes to a more unqualified affirmative, for who can question its facilitating influence upon "the current affairs" of both the liver, and the one who lives.

Crudely expressed, mineral waters absorbed by the stomach pass rapidly into the portal circulation; and a considerable proportion thus permeates the liver—physiologically stimulating, and semi-mechanically flushing out, that important digestive and excretive organ. Hence, their effect is cholagogue, anti-catarrhal of the much-accused hepatic duct, both chemically corrective and hydro-dynamically expulsive

of gall stones—and, moreover, the best remedy for the constitutional habit which predisposes to their formation.

It would be impossible even to outline, within the scope of this work, a moiety of the hepatic derangements to which hydro-mineral treatment is applicable in some degree ; suffice it to say, that, except in some rare structural degenerations, or, the still more infrequent conditions of pressure upon the portal circulation by aneurismal, cancerous, hydatid, or other tumors—in which cases, it might be desired to limit the quantity of fluid ingested—the intelligent use of the Saratoga waters is invariably helpful.

In cirrhosis, and its accompaniments, these waters are exceptionally useful ; also, in general torpidity or biliousness ;

in the chronic hyperæmia following residence in tropical climates, or associated with the malarial, gouty, or specific cachexiæ ; and, in all forms of resultant jaundice—more especially, in that attributable to obstructive catarrh of the biliary duct, without prominent symptoms of inflammation. Their happy influence is manifest, not only in augmenting functional activity, and increasing the excretion and fluidity of the bile ; thus, relieving the nerve centers, and the kidneys—often sorely tested—from the toxical presence of bile in the blood ; but also, by removing cutaneous pigmentation, correcting icteric itch, and improving the general health.

Ascites demands a passing word, more especially, as the dropsies of car-

diac and renal origin come less distinctly within the hydriatic sphere. Except in cases of malignant origin, these waters are an exceptionally useful adjunct to other curative measures; tending to amend the causative condition, and to promote absorption—by stimulating the kidneys, skin, and intestines.

The alkaline waters are always serviceable—the proportion of saline admixture, or the advisability of iron, being determined, as in other diseases, by the relative prominence of plethora or anæmia. As a general rule in liver derangements, the milder waters are most suitable, and are best taken warm; but cold, and highly gaseous, water will sometimes control the obstinate vomiting common in these cases. Warm

mineral baths are invariably useful; and the application of local douching is extensively practiced abroad. Extremes of temperature should never be used.

Metallic Poisoning.—In connection with diseases of the liver, may be mentioned chronic metallic poisoning by mercury, arsenic, lead, or copper. However absorbed into the system, these metals show a distinct affinity for the liver; and, are deposited in its substance in greater proportion than in any other tissue. The alkaline-saline waters, freely imbibed, possess an unequaled power in promoting their elimination; and the chalybeates in subsequently restoring constitutional tone.

Pancreas.—So rarely are organic

changes of this important digestive gland, or the presence of concretions in its substance, diagnosticated during life, in contra-distinction from the usually co-existing diseases of the liver, and other adjacent organs, that the writer can find no record of the results of treatment ; and admits, without diffidence, an entire lack of personal experience. If, however, such a case were to present itself, he would not hesitate to treat it, cautiously, upon the well recognized principles applicable to the more familiar conditions of the liver.

Constipation.—This distressing condition is dependent upon the unassimilable character of food ; defects of the digestive secretions which should chemically alter its quality, and facilitate its

absorption, or passage through the alimentary canal; and muscular atony, or lack of peristaltic power in the stomach or intestines. In ordinary practice, it is deemed important to distinguish the relative prominence of these causative factors, before undertaking treatment; and, no form of empiricism is more worthy of condemnation than the "shot gun" prescription, or its prototype, the advertised cathartic pill, containing a little of everything: of which it is hoped that some one ingredient may hit the right spot, and so afford relief—probably of short duration—while it is pretty certain, that the remaining items will only disturb previously normal function, and so aggravate the original difficulty. The Saratoga and similar waters are, however, an exception to this condem-

nation of an universally applicable purgative compound; for although, they unquestionably stimulate peristalsis, promote the secretion of the digestive ferments, and hydro-dynamically assist the evacuant function of the intestines; and hence, might be regarded as a typical volley at almost every form of constipation, they produce all of these effects without unduly localized irritation; and experience proves that their judicious use is entirely free from subsequent ill effect. Nevertheless, the fact should be emphasized that *no mineral waters*—not even the bitter waters of Pulna, Friedrichshall, Hunyadi, or the Rubinats—alone, and unaided by the products of pharmacy, are suitable remedies with which to force efficient catharsis in the obstinately costive state, much less,

in ill-defined intestinal obstructions; nor, can the continued use of any saline aperient be regarded as a proper treatment for chronic constipation. In most persons, any of the markedly gaseous and saline waters will, when taken cold, during the morning hours, and followed by moderate exercise, induce easy and satisfactory alvine movements—in promoting which purpose, the carbonic acid gas is an important item. To this primary effect, may no doubt be attributed much of their generally salubrious influence, which in turn, contributes to the permanent cure of constipation, as of similar ailments often largely dependent on perverted constitutional habit.

Abdominal Stasis.—No class of invalids derive more benefit from a well

directed hydriatic course than those suffering from that, somewhat vaguely expressed, condition of congestive debility, known as *abdominal plethora*, or the hemorrhoidal habit. This state is characterized by general torpidity of the digestive apparatus, sluggishness of the abdominal circulation, and venous stasis of pelvic organs. It is usually, although not necessarily, associated with constipation and corpulence ; and, not unfrequently with fatty heart, or functional cardiac insufficiency. It is sometimes dependent upon the cachexiæ—especially the *malarial*, with accompanying enlargement of the liver and spleen—and commonly evinces itself by rectal and prostatic engorgement, and the appearance of piles. In women it is a frequent cause of subacute ovaritis

and uterine disorders. It produces, in many instances, extreme nervous depression, and may be regarded as the physical condition, of which hypochondriasis is the mental expression. Such cases usually demand as vigorous treatment, as co-existing organic derangements, will permit. The alkaline-saline waters internally—or, if marked constitutional anæmia, without symptoms of cerebral congestion, the saline-chalybeates; together with, some form of energetic bathing. The douche-massage, and ascending douche, are especially useful.

OBESITY.—The photographer has distanced the physician in reducing lovely woman to the graceful contour which her fancy prescribes, while her indolent habits, and vigorous appetite, just as

energetically deny. In men, over-eating, alcoholic indulgence, and want of exercise are the usual causes of obesity; but some persons of abstemious habits are abnormally disposed to fat; and, to both sexes, about the middle period of life, there not uncommonly comes an unwonted tendency in this direction. No medical treatment directly influences the accumulation of fat, without serious, and often permanent, impairment of general health. The only rational methods of controlling its deposit are the adoption of a modified and restricted dietary—excluding, as far as possible, sugar, the carbo-hydrates, and other notably fat-forming foods; together with systematically increased exercise, and, such other measures as favor the physiological conversion of fats, and

promote eliminative metabolism. The internal use of the alkaline-saline waters furthiers these ends—not only by augmenting tissue-change, but also, by stimulating the emunctories, and so facilitating the removal of used-up material. But to obtain marked results, they must be taken freely, although, never pressed to the extent of inducing painful catharsis or diarrhœa.

Baths, however, and those of the distinctly energetic character, which, as explained in the chapter on balneology, promote *metabolism*, are decidedly the most reliable means, yet known to science, of reducing superfluous adiposity. But, if success would be attained, the *rationalé* of their action must be thoroughly understood. Free perspiration in the Turkish bath will cause an

immediate reduction of weight, and so may delude one, struggling against corpulence, into the gratifying belief that he has already been made thinner; but unfortunately this loss is almost entirely of *water*, which is soon replaced in the ordinary course of even moderate alimentation, whereas, scarcely any real effect has been produced upon fatty tissue, by the easily graded, although often intense, temperatures commonly applied in these baths. On the other hand, either extremes of heat or cold, or more efficacious still, the sudden alternation of markedly contrasting temperatures—especially from heat, as in the vapor bath, to cold, by the plunge or douche—have been proven to exercise a pronounced influence, in promoting the physiological combustion and removal

of fat. The ordinary cold bath—and mineral water, when easily obtainable, is to be preferred, for reasons already stated—tends in this direction ; but, as it is the *thermic shock*, rather than any special quality of the water, which produces this special effect, the method of obtaining it to the fullest degree, is to *emphasize* the impression of cold, by the preparatory application of heat. It need not be added, that bathing of this character might, under some circumstances, be hazardous, and should only be undertaken by those who are organically sound, and under careful direction.

CATARRH.—Wherever in the human body there exists a mucous surface, local irritation, or perverted constitutional habit are apt to occasion the ob-

stinate subacute inflammation, with consequent morbid secretion, known as *catarrh*. This unhealthy influence may affect the nasal, faucial, pharangeal, bronchial, pulmonary, gastric, hepatic, cystic, intestinal, rectal, vesical, urethral, uterine, or vaginal mucous membranes; but, wherever it appears, or whatever type it assumes, there is always one point in common: all catarrhs are benefited by alkaline remedies; and, never more constantly, than when administered as alkaline, or alkaline-saline mineral waters.

Not only is their influence, by increasing the alkalinity of the blood and secretions, essentially anti-catarrhal, and, is hydro-mineral treatment generally, almost specific in the constitutional dyscrasiæ, so often associated with, and

causative of, the catarrhal state; but, even when applied locally, these waters possess merits difficult to equal from the products of pharmacopœia. For the post-nasal space and throat, as a wash or spray; for the stomach, rectum, and vagina, as a douche or irrigation; for the cystic duct and bladder as a pack; and for the catarrhal tendency generally, in almost any phase of balneological technique, the Saratoga waters offer a potent remedy—both curative and prophylactic.

RENAL DISEASES.—Diuresis is such a constant effect of the Saratoga waters, that, all who drink them must notice how considerably and invariably is augmented the excretion of urine; and so, can scarcely doubt their influence, for good or evil, in abnormal conditions

of the kidneys. The general washing out of the system, which constitutes the most prominent primary result of unaccustomed imbibation, is mainly completed through increased renal activity. In some proportion to the quantity consumed, an unusual amount of water is absorbed into the circulation, a general lixiviation of the tissues ensues, and the kidneys are required, more than all other excretory organs together, to carry off, not only the superabundant fluid so acquired, but with it, a largely increased proportion of the ordinary ingredients of normal urine.

From such an obvious influence, independent of clinical experience, may be readily inferred the therapeutic applicability of these and similar waters.

So long as the exquisitely delicate anatomical bodies which compose the working substance of the kidney, are structurally intact, they evince a readiness—which might well shock a modern trade's union—for whatever extra work unusual circumstances may necessitate. However remiss the liver, skin, and other co-scarvengers of the human organism, these indefatigable little workers are ever prepared to perform extra duty; and hence, are our most reliable auxiliaries in correcting morbid conditions of constitutional torpidity. Mineral waters stimulate renal function; and, as in the other excretory processes, by increasing fluidity, facilitate its performance. They dilute irritant urine, dissolve and expel concretions formed in the substance or pelves of the kid-

neys, or bladder, or retained in the ureters; and so, are especially indicated in the treatment of gravel or calculus, and in catarrhs of bladder and urethral membranes. In these conditions the milder alkaline waters are absolutely unequalled.

When, on the other hand, as in all forms of Bright's disease, organic degeneration is already in progress, and these once perfect physiological structures—formerly ready to undertake all manner of supplementary excretion—are no longer equal to the normal performance of their legitimate function, it would be manifestly ill-advised to force upon them extra work, which might possibly be transferred elsewhere. Hence, although the other influences of these waters should still be consid-

ered, which, by coincidently stimulating the liver and skin, may even relieve renal inadequacy, hydro-mineral treatment is applicable only, in the mildest forms, and under skillful supervision.

DIABETES.—This frequent and formidable disease is still homeless in nosological classification. Whether, it is primarily of cerebral, cerebro-spinal, hepatic, or pancreatic origin ; or, should be regarded as a general neurosis ; or, precisely how important, from an etiological standpoint, should be estimated the hereditary, mental, gouty and other extraneous influences with which it is commonly associated—are points which have not yet been scientifically determined. Certain it is, that least of all does it belong to distinctly renal dis-

eases, among which it is usually placed by the non-medical public. It may be frankly confessed that knowing so little of its causation, and scarce more of its subsequent organic chemistry, we are guided in treatment almost entirely by observation and experience. It is not therefore, as in diseases previously considered, so much by rational deduction, as upon the faith of a practically unanimous authority, backed in some measure by personal observation, that a carefully regulated hydro-mineral treatment is here recommended.

Persons suffering from the more chronic forms of diabetes, are unquestionably among the most regular frequenters of the principle foreign spas—and without regard as to the distinctive characteristics of the particular

waters—yet, no class of invalids lay claim to more constant benefit. Saratoga has an equally happy, if less extensive, record in similar cases.

When uncomplicated by hepatic, gouty, malarial, or markedly anæmic tendencies, which, as in other diseases, must be carefully considered, the milder alkaline-saline, and notably alkaline waters, are the best ; and may be taken, with apparently equal advantage, either warmed or at the natural temperature. Warm baths of all kinds are unquestionably serviceable in diabetes. Those of Saratoga water, have the additional advantage of a more directly stimulating influence upon the skin—an immeasurable service in this disease. The cold-water system is seldom admissible.

The essential importance of a special

diet needs no comment in this connection.

DISEASES OF THE VASCULAR SYSTEM.—
In serious organic diseases of the heart—particularly those of the valves, and in atheromatous or calcareous degeneration of the blood vessels, the more energetic methods of hydriatic treatment are positively interdicted, for general use. A special caution is necessary in cases of aneurism. When directed, however, by those conversant with the management of cardiac diseases, and familiar with the effects of mineral waters, their favorable influence upon general nutrition may still be exercised without danger; and even with marked benefit, in conditions of organic insufficiency. Only baths of medium temperatures are admissible in these cases.

In the functional cardiac neuroses, which not uncommonly result from the abuse of tea or tobacco, or indulgences involving nervous hyper-excitement, although the stronger springs are to be avoided, the mild alkaline-saline waters are serviceable ; and excellent results may be obtained from baths—both soothing and exhilarating.

DISEASES OF BONE.—The rachitis of early life, the decalcification of later years known as osteo-malacia, and simple caries or necrosis occurring at any period of life, are all so nearly connected with the dyscrasiæ—the malarial or specific taint—that, the pretty constant benefit derived from hydro-mineral treatment is probably attributable to improvement of general health, rather than to the presence of lime, or

any other special ingredient of the water.

SKIN DISEASES figure prominently in the category of maladies curable by almost every mineral spring. These affections, in most instances, are but an expression of some morbid constitutional condition; and so, will be indirectly benefited by any treatment tending to promote nutrition. And so manifest is the influence of these waters upon the function of the healthy skin, that it is impossible to doubt their alterative potency in the abnormal conditions of that important organ. It is difficult, however, to believe that the immediate application of a fluid, so essentially stimulating as saline mineral water, can be advantageous to a surface already characterized by hyper-irritability.

Some cutaneous affections of the markedly atonic type are no doubt cured, as in ordinary practice, by the local use of remedies primarily irritant. Water itself is essentially beneficial in the widest range of skin diseases, and so, it might be unwise to expose a fallacy, which has brought the unwashed to water—and so verily effected the cure ; but, one accustomed to the treatment of the chronic exanthemata, and eczematous conditions generally, may well suspect that these happy results, from immersion in saline water, have been attained not because, but in spite, of the ingredients. The alkaline waters, and those containing in marked proportion the salts of lime, are most soothing to cutaneous surface.

DISEASES OF WOMEN are usually as-

sociated with, and often caused by, the co-existence of pelvic *congestion*, with constitutional *anæmia*. This is equally true of the many functional disturbances of menstruation, as of chronic ovaritis, salpingitis, abnormal growths, displacements, lacerations, hyperplasia, and leucorrhœa; and, is the essential point upon which hinge most successful systems of treatment. It also happens, not unfrequently, that these ailments—notably those of the obstinately catarrhal type—are closely connected with the cachexiæ, especially the gouty; and, it is by no means an uncommon experience for chronic endometritis or leucorrhœa, which had resisted every other treatment, to yield before a well directed anti-lithæmic course. Hence, from every standpoint, some use

of the Saratoga waters is indicated in these cases ; and if not directly curative, they will be found a powerful auxiliary to other measures. For marked venous congestion of the pelvic organs, the alkaline-saline waters may be used internally ; together with a carefully selected system of bathing, of which local irrigation may form an important part. For more distinctly anæmic patients—the saline-chalybeate waters, or such combination as circumstances suggest ; and when admissible, the cold-water system. In *chlorosis*, or pernicious anæmia, of which amenorrhœa is a pretty constant symptom, the hydro-mineral treatment offers more hope than all other remedies.

NERVOUS DISEASES.—In combating these merciless and enigmatical ail-

ments, which are everywhere a growing scourge to civilized humanity, and nowhere more keenly felt than in this community, we have a powerful, but, as yet, scarcely recognized ally in scientific balneology. That the external use of water ranks with electricity, in the treatment of these diseases, is a general opinion among those who have studied the subject most carefully.* But in these diseases, more than any other, it is important that the technique of bathing should be skillfully prescribed; and sometimes, it is essential that the patient should submit to a regular, and somewhat complicated course, under competent direction. In the infinitely varied conditions of functional character, often resulting from overwork or

* Charcot, Dujardin-Beaumetz, Dana, and others.

prolonged anxiety, in which, without tangible pathological change, the nervous system demands invigoration, extraordinary benefit is derived from all forms of cold bathing. In some instances the alternate application of hot and cold water, by the rain bath or douche, gives even better results. On the other hand, for the more irritable types of neurasthenia, we have, in the prolonged tepid bath and wet pack, an unequaled means of soothing nervous excitement; and often inducing quiet and refreshing sleep, which could not otherwise be obtained. By these means are benefited the innumerable vaso-motor derangements, and functional impotences, for the treatment of which, we have relied heretofore upon the administration of nervine

stimulants, electricity, and massage. Wherever these remedies were indicated, hydrotherapy can accomplish the same end, with the added merit of more direct improvement of general health; and a constant compatibility with other methods of treatment. For most of these cases the saline mineral waters possess exceptional utility. The internal use of the waters may be suggested by the circumstances.

RETARDED CONVALESCENCE.—During progressive recovery from serious illness there sometimes occurs a period, when in spite of the best directed efforts, and without any expressly assignable cause, exhausted nature declines to make further progress toward accustomed health. It has been observed following the infectious exanthemata, typhoid

fever, pneumonia, diphtheria, severe abdominal inflammations, serious surgical operations, and hemorrhage occurring at child-birth, or from other causes. The recent influenza epidemics, afforded not a few examples of persons apparently recovered, but still, dating from the attack, a debility before unknown; which unfortunately, culminated, in many instances, in fatal pneumonia or pulmonary phthisis. The anæmia so established is of a markedly irritative character; seemingly dependent upon exhaustion or perversion of nerve energy, rather than absolute poverty of blood, or inherently defective vascularity. It manifests a determined resistance to all forms of ordinary treatment. For this condition a visit to Saratoga, and well directed

hydro-mineral course, gives promise of the best result ; and in a few weeks, may recall more of the familiar self, than months of the most skillful treatment at home. Mineral springs are everywhere celebrated for the cure of old wounds.

CHAPTER XII.

BOTTLED AND RE-CHARGED MINERAL WATERS.

It is always best, when possible, to visit the springs and drink of, and bathe in, the waters fresh from the fountain head ; for, not only does the invalid thus reap the benefits of general change, healthful country air, easier compliance with sanitary precepts, and other auxiliary circumstances ; but it should be remembered, that natural mineral waters are difficult to preserve, and exceedingly liable to deteriorate in transit, or under the ordinary conditions of careless storage.

At some of the most valuable springs

the method of bottling is still lamentably defective. The water, instead of being tapped low down in the tubing, is allowed to flow from the surface, and only reaches the bottles after much of the gas has already escaped ; the corks are often imperfect ; even the glass is sometimes of a quality to chemically contaminate the water ;* and worst of all, it not uncommonly reaches the consumer after having stood for months in some drug store, regardless of temperature, the position of bottles, or other precaution for its preservation. As a consequence, much of the naturally abundant carbonic acid gas is lost ; the alkaline carbonates, held by it in solution, as bicarbonates, are largely precipitated ; the iron rapidly oxidizes,

* Breneman,

and falls as the familiar brown sediment of hydrous peroxide ; and, the water itself becomes turbid and dirty looking—its bright, sparkling character and delicious tingling taste being replaced by qualities flat, insipid, and disgusting. In consequence is pronounced many an unjust verdict upon the Saratoga waters, by those who have never drank them fresh at their source, but, judge only by the mawkish stuff supplied from the drug store. Nor is the retailer entirely to blame. The fault usually begins at the spring ; and further, so many new waters, the majority possessing no special merit, have been forced upon the market, yet comparatively seldom called for, that it would be impossible for the ordinary drug store to carry a fresh stock of each,

If the proprietors of the various springs could be induced to set aside their traditional jealousies, to the extent of maintaining in each of the large cities a joint emporium, where the waters could at all times be obtained fresh and in good condition, it would surely be to their individual gain, and largely to the advantage of the public. The date of bottling should be stamped on each label; and further, it may be hinted, that as all the springs, in season and out of season, are wasting enormous quantities of water—some as much as two gallons per minute—the price might be lowered, with still increased profit resulting from a larger sale. The adoption of these suggestions would soon render it difficult for the foreign waters, now so popular through-

out this country, to retain their supremacy.

It is impossible to leave this part of the subject without reference to the suicidal recriminations of some of the spring proprietors a few years ago ; which, at the time, did much to discredit Saratoga. Without entering upon the nauseous evidence of this quarrel, the writer does not hesitate to assert, that, however dishonest the purpose, it would be impossible, in face of the volume of water, and the immense force with which it is driven upward from most of the springs, to tamper with the waters extensively until after they had left the source. Indeed, so copiously mineralized, and naturally saturated with gas, are the principle Saratoga waters, that, it would be diffi-

cult to introduce more than nature has already furnished. The Kissengen, Patterson, Royal, Peerless, Hathorn, Congress, Excelsior, and probably other waters, are supplied in bottles, exactly as they come from the source. That at any spring it should be deemed necessary to re-enforce the water with supplementary gas as is sometimes done at the time of bottling, is scarcely to be understood, except it be to repair negligence, or unskillful handling.

At several of the springs, the quantity of gas is phenomenally large—capable of driving the water a considerable distance upward. The peculiar odor of carbonic acid is very perceptible near those which are closed in; and sometimes, the air becomes sufficiently impregnated with it, to be

dangerous to breathe, and even extinguish a light.

At the Lafayette Spring, a short distance south of the Champion, a curious industry has recently been established. The water ascends with enormous force. It is liberally mineralized, and by no means unpleasant to taste; nevertheless, it is not used either for drinking or bathing purposes, but exclusively for the commercial value of the natural carbonic acid gas obtained from it. As the water issues from the tubing, it is guided into powerful machinery, where the gas is separated, liquified at enormous pressure, and forced into strong steel cylinders, ready for sale. The refuse water passes off flat and brackish.

At the Johannis Spring, at Zollhaus,

Nassau, which resembles in many respects the alkaline springs of Saratoga, the water is treated in a somewhat similar manner, although for a different purpose. Like the Saratoga waters, it contains a trace of iron, and the object of the artificial process is to get rid of that mineral, in order to render the water miscible without discoloration with wines and spirits, and thus more suitable for table use. The carbonic acid is collected, as the water emerges from the spring, and forced into a gasholder. Then, the water is freely exposed to the atmosphere in open tanks, so as to allow the oxidation of the proto-carbonate of iron, which is thus converted into, and precipitated as, a basis hydroxide; and lastly, by means of powerful pumps, the same

gas is re-charged into the water; which is then ready for bottling, and is by no means unpleasant to drink. It is, however, distinctly dishonest to advertise such a product, as "a natural mineral water"; since the original association of gases and mineral salts, upon which undoubtedly depends the therapeutic value of natural waters, has been decomposed by the withdrawal of the gas, and cannot be exactly restored by artificial means. In fact, water so treated, differs in no respect from the chemical imitation manufactured in the ordinary way, except inasmuch, as there is still some guarantee of the purity of the gas and minerals, and freedom from dangerous organic impregnation.

It is claimed that a water aerated under pressure with its own natural gas,

gives out that gas at a slower rate, when the pressure is withdrawn, than a water similarly aerated with artificial gas. However this may be, it seems proven that gas naturally incorporated with mineralized water is retained longer than similar gas artificially introduced into water similarly mineralized. No matter what the primary qualities of the natural waters, once the gases are discharged, and the water evaporated, the remaining salts are chemically identical with those produced in the ordinary way. They have entirely lost what special virtues they possessed in the original natural combination, and when re-dissolved in water, must be taken in many times a larger dose to produce effects resembling those of the original water.

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